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COMMONWEALTH of VIRGINIA

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December 9, 2010

Mr. Jim McKenna
Radford Army Ammunition Plant
Route 114, P.O. Box 1
Radford, Virginia 24143-0100

Re: Remedial Action Work Plan- NRU- Radford Army Ammunition Plant

Dear Mr. McKenna:

The Virginia Department of Environmental Quality (VDEQ) has reviewed the Response to Comments for the Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and the Building Disposal Trench New River Unit (RAAP-044) dated November 2010 and approves the work plan as revised.

Please contact me at (804) 698-4498 if you have any questions or comments regarding the above site.

James L. Cutler, Jr., CPG
Federal Facilities Project Manager

cc: Paige Holt, ATK
Aziz Farahmand, VDEQ-BRRO

ATK Armament Systems
Energetic Systems
Radford Army Ammunition Plant
Route 114, P.O. Box 1
Radford, VA 24143-0100

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November 10, 2010

Mr. James L. Cutler, Jr.
Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 23219

Subject: Transmittal Acknowledgement,
Final Remedial Action Work Plan for the Bag Loading Area,
Igniter Assembly Area, and Building Debris Disposal Trench
New River Unit (RAAP-044) November 2010

Dear Mr. Cutler:

This letter is to acknowledge transmittal of the subject document that was sent to you and the Restoration Advisory Board on November 8, 2010. Enclosed is a copy of the 8 November 2010 transmittal email.

Please coordinate with and provide any questions or comments to myself at (540) 639-8658, Jerry Redder ATK staff (540) 639-7536 or Jim McKenna, ACO Staff (540) 731-5782.

Sincerely,

P.W. Holt, Environmental Manager
Alliant Techsystems Inc.

c: Karen Sismour
Virginia Department of Environmental Quality
P. O. Box 1105
Richmond, VA 23218

E. A. Lohman
Virginia Department of Environmental Quality
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3019 Peters Creek Road
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10-815-167
JMcKenna

Rich Mendoza
1 Rock Island Arsenal
Attn: IMAE-CDN
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Coordination: J. McKenna

10-815-167
JMcKenna

Greene, Anne

From: McKenna, Jim
Sent: Monday, November 08, 2010 2:40 PM
To: Greene, Anne; Cutler,Jim; dennis.druck@us.army.mil; diane.wisbeck@arcadis-us.com; durwood willis2; Redder, Jerome; Lohman,Elizabeth; Mendoza, Rich; Meyer, Tom NAB02; Parks, Jeffrey N; Sismour,Karen; Timothy.Leahy@shawgrp.com; Kalinowski, Chris; diane.wisbeck@arcadis-us.com
Subject: RE: Radford-NRU RAWP (UNCLASSIFIED)
Attachments: 20101103 RTC VDEQ Comments on Draft RAWP for BLA IAA and BDDT.pdf

Importance: High

Classification: UNCLASSIFIED
Caveats: FOUO

All,

The contractor will ship the Final Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench, New River Unit (RAAP-044) today. Attached to this email are the responses to the 11/01/2010 DEQ comments. Note, as the minimal changes were needed to the draft work plan replacement pages are being sent out instead of reproducing and resending the entire work plan. Below are the POCs and their respective Fed Ex numbers.

Thank you for your support of the Radford AAP Installation Restoration Program

Jim McKenna

Recipient/Copies/Fed Ex Tracking Number

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2) Cover and Signature Pages

3) Pages 33/34 and 35/36

4) Figures 2-7A, 3-1, 3-2, and 3-3

5) Appendix D - Schedule

Classification: UNCLASSIFIED
Caveats: FOUO

Comments and Responses on the
Draft Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench
New River Unit RFAAP 044
Radford Army Ammunition Plant
October 2010

Item No.	Report Reference	COMMENT	RESPONSE
Commenter: Jim Cutler (RFAAP) – email comments from November 1, 2010			
1	Section 4.5.1	It is stated that the original excavation will be expanded in areas where historical sampling has indicated COC concentrations above the applicable RALs. Previous text and maps indicate only a two foot initial excavation swath and where there is visible evidence of contamination. Do you anticipate any additional initial excavation at the BLA or the IAA?	*The initial excavation activities at the BLA and IAA will be conducted within 2-feet of the open sides of the buildings and in areas where there is visual evidence of staining from the degraded flooring. During performance of the work, confirmation soil samples will be collected from the excavation perimeter to determine if there are any areas where the excavation boundaries need to be further expanded to achieve the RAOs.*
2	Section 5.2	There should be an additional objective that relates to controlling erosion, soil migration and exposure at the BDDT. This IC would require scheduled inspections of the rip/rap liner system and surrounding vegetation and maintenance as required.	*Section 5.2 has been updated to add the objective of minimizing the potential for COCs present in surface soils to migrate to other areas. Section 5.3 has been updated to state that LUC implementation would include inspection of the rip rap and vegetation.*
3	Figure 3-1	There is no yellow shading of detections exceeding residential PRGs. If the intent was to only indicate industrial exceedances then the reference to residential should be eliminated from the legend.	*The reference to the residential PRGs was removed from the legend in this figure. The intent of this figure was to indicate areas where target COCs were present at concentrations above the industrial PRGs that will be used to guide the response actions at the BLA.*
4	Figures 3-2 and 3-3	The printed color keys for residential and non detected are practically indistinguishable. Another color scheme should be substituted.	*The color coding scheme for Figures 3-2 and 3-3 have been modified so that the exceedances of the residential PRGs are more easily distinguished.*

Note: Minimal changes were required to the Draft Remedial Action Work Plan; therefore, in lieu of distributing full new copies of the report, replacement cover pages, text, and figures will be forwarded to those individuals on the document distribution list that receive paper copies of the report.

ATK Armament Systems
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Radford, VA 24143-0100

www.atk.com

October 28, 2010

Mr. James L. Cutler, Jr.
Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 23219

Subject: Transmittal Acknowledgement, Draft Remedial Action Work Plan
for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench,
New River Unit (RAAP-044) October 2010

Dear Mr. Cutler:

This letter is to acknowledge transmittal of the subject document that was sent to you and the Restoration Advisory Board on October 27, 2010. Enclosed is a copy of the 27 October 2010 transmittal email.

Please coordinate with and provide any questions or comments to myself at (540) 639-8658, Jerry Redder ATK staff (540) 639-7536 or Jim McKenna, ACO Staff (540) 731-5782.

Sincerely,

P.W. Holt, Environmental Manager
Alliant Techsystems Inc.

c: Karen Sismour
Virginia Department of Environmental Quality
P. O. Box 1105
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Virginia Department of Environmental Quality
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10-815-156
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J. McKenna, ACO Staff
Rob Davie-ACO Staff
P.W. Holt
J. J. Redder
Env. File

Coordination: J. McKenna

10-815-156
JMcKenna

Greene, Anne

From: McKenna, Jim
Sent: Wednesday, October 27, 2010 3:43 PM
To: Greene, Anne; Cutler,Jim; dennis.druck@us.army.mil; diane.wisbeck@arcadis-us.com; durwood willis2; Geiger.William@epamail.epa.gov; Redder, Jerome; jim spencer; Llewellyn, Tim; Lohman,Elizabeth; Mendoza, Rich; Meyer, Tom NAB02; Parks, Jeffrey N; Sismour,Karen; Timothy.Leahy@shawgrp.com; Tina_MacGillivray@URSCorp.com; Kalinowski, Chris; diane.wisbeck@arcadis-us.com
Subject: RE: Draft RAWP for the NRU (UNCLASSIFIED)

Importance: High

Classification: UNCLASSIFIED
Caveats: FOUO

All,

The contractor will ship the Draft Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench, New River Unit (RAAP-044) today. Below are the POCs and their respective Fed Ex numbers.

Thank you for your support of the Radford AAP Installation Restoration Program

Jim McKenna

James McKenna 7963 8680 4073 2 Paper copies + 2CDs

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Tom Meyer 7969 5011 8709 1 Paper copy/1 CD

Richard Mendoza 1 Paper Copy/1 CD (holding per COR email dated 10/27/2010)

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Elizabeth Lohman 7940 5435 1491 1 CD

Karen Sismour 7963 8691 7374 1 Paper copy

Susan Ryan 7940 5424 2954 1 CD

Classification: UNCLASSIFIED
Caveats: FOUO

DEPARTMENT OF THE ARMY
US ARMY PUBLIC HEALTH COMMAND (PROVISIONAL)
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5403

8 OCT 2010

MCHB-IP-REH

MEMORANDUM FOR Office of Environmental Quality, Radford Army Ammunition Plant (SJMRF-OP-EQ/Mr. Jim McKenna), P.O. Box 2, Radford, VA 24143-0002

SUBJECT: Internal Draft Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench, New River Unit (RAAP-044), Radford Army Ammunition Plant, Virginia, September 2010

1. The US Army Public Health Command (Provisional), formerly the US Army Center for Health Promotion and Preventive Medicine, reviewed the subject document on behalf of the Office of The Surgeon General pursuant to Army Regulation 200-1 (Environmental Protection and Enhancement). We appreciate the opportunity to review the work plan.

2. We have no comments to provide on this document.

3. The document was reviewed by Mr. Dennis Druck, Environmental Health Risk Assessment Program. He can be reached at DSN 584-2953, commercial (410) 436-2953 or electronic mail, dennis.druck@us.army.mil.

FOR THE COMMANDER:

JEFFREY S. KIRKPATRICK
Director, Health Risk Management

CF:
HQDA (DASG-PPM-NC)
IMCOM-NE (IMNE-PWD-E)
USACE (CEHNC-CX-ES)
USAEC (IMAE-CD/Mr. Rich Mendoza)

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Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench New River Unit (RAAP-044)

Radford Army Ammunition Plant
Radford, Virginia

Prepared for:
Radford Army Ammunition Plant

November 2010

Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench New River Unit (RAAP-044)

Radford Army Ammunition Plant

Radford, Virginia

November 2010

Remedial Action Work Plan for the Bag Loading Area, Igniter Assembly Area, and Building Debris Disposal Trench New River Unit (RAAP-044)

Radford Army Ammunition Plant

Peter Frederick, CIEC
VA Asbestos Project Designer 3305-000935
Southern Region Asbestos/HM Manager

Chris Kalinowski, P.E.
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Prepared for:
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Our Ref.:
GP08RAAP.0044

Date:
November 2010

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A Site Specific Accident Prevention Plan

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01070 – Asbestos Containing Material Abatement and Disposal

02110 – Vegetation Clearing

02200 – Earthwork

02250 – Transportation and Disposal of Materials

02290 – Erosion and Sediment Control

02936 – Establishment of Vegetation

D Project Schedule

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Acronyms and Abbreviations

AAL	Air Action Level
AAR	Asbestos Analyst Registry
ACM	Asbestos Containing Material
AEC	U.S. Army Environmental Command
AIHA	American Industrial Hygiene Association
amsl	Above Mean Sea Level
ARAR	Applicable or Relevant and Appropriate Requirements
ATK	Alliant TechSystems, Inc.
bgs	Below Ground Surface
BLA	Bag Loading Area
CARB	California Air Resource Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Constituent of Concern
CY	Cubic Yard
DOLI	Department of Labor and Industry
EE/CA	Engineering Evaluation/Cost Analysis
ELCR	Excess Lifetime Cancer Risk
EPC	Exposure Point Concentration
EQ	Environmental Quality Company
EU	Exposure Unit
ft	Feet
ft msl	Feet Above Mean Sea Level
FS	Feasibility Study
HEPA	High Efficiency Particulate Air
HHRA	Human Health Risk Assessment
IAA	Igniter Assembly Area
IRP	Installation Restoration Program
MMA	Main Manufacturing Area
NBG	Northern Burning Ground
NCP	National Contingency Plan
NROW	New River Ordinance Works
NRU	New River Unit
NVLAP	National Voluntary Laboratory Accreditation Program
PAH	Polycyclic Aromatic Hydrocarbon
PAT	Proficiency Analytical Testing
PBC	Performance Based Contract

Acronyms and Abbreviations (cont)

PCB	Polychlorinated Biphenyl
PCM	Phase Contrast Microscopy
PLM	Polarized Light Microscopy
QAPA	Quality Assurance Plan Addendum
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAL	Remedial Action Level
RAO	Remedial Action Objective
RFAAP	Radford Army Ammunition Plant
RI	Remedial Investigation
RSL	Regional Screening Levels
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TEM	Transmission Electron Microscopy
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compound
XRF	X-Ray Fluorescence

1. Introduction

ARCADIS U.S, Inc. (ARCADIS) has been retained by the United States Army Environmental Command (AEC) to perform Installation Restoration Program (IRP) activities at the Radford Army Ammunition Plant (RFAAP). The RFAAP facility is located in Montgomery and Pulaski Counties in southwestern Virginia and consists of two noncontiguous units: the New River Unit (NRU) and the Main Manufacturing Area (MMA). The RFAAP-MMA is located approximately 5 miles northeast of the City of Radford, Virginia. The RFAAP-NRU is located about six miles southwest of the RFAAP-MMA, near the town of Dublin, Virginia (Figure 1-1). IRP activities for both the RFAAP-MMA and the RFAAP-NRU are being conducted as part of a Performance Based Contract (PBC) awarded to ARCADIS under contract W91ZLK-05-D-0015: Task 0002. The RFAAP-NRU is managed under the Comprehensive Environmental Response and Compensation Liability Act (CERCLA).

This site-specific Remedial Action Work Plan (RAWP) has been prepared to outline the scope of work for the remedial activities that will be conducted at the following sites within the RFAAP-NRU:

- Bag Loading Area (BLA);
- Igniter Assembly Area (IAA); and
- Building Debris Disposal Trench (BDDT).

As presented in the Feasibility Study (FS) Report (ARCADIS, 2010b) and the Proposed Plan (RFAAP, 2010) for RFAAP-NRU, response actions have been recommended for the BLA, IAA, and BDDT sites. The primary response actions for the BLA and IAA include: 1.) removal of asbestos and metals containing conductive flooring material from building remnants, and 2.) excavation of surface soils that contain constituents at concentrations that pose unacceptable risks to current and/or hypothetical future receptors. The response action that will be implemented for the BDDT site consists of Institutional Controls (ICs). ICs will also be utilized as part of the response actions for the BLA and IAA.

This work plan incorporates by reference applicable sections of the Master Work Plan (URS, 2003) and Standard Operating Procedures (SOPs). The general health and safety requirements for fieldwork at the RFAAP-NRU are included in the Health and Safety Plan (HASP) addendum (ARCADIS, 2008a), which has been provided under

separate cover. A Site-Specific Accident Prevention Plan that details the health and safety requirements for the activities outlined in this RAWP is included as Appendix A. ARCADIS has also prepared a Quality Assurance Plan Addendum (QAPA) (ARCADIS, 2008b) for the Master Work Plan, which has been attached as Appendix B.

1.1 Purpose and Scope

The purpose of the RAWP is to define the scope and the technical specifications for the remedial activities that will be performed at the site. This RAWP provides a detailed description of the design and specifications for the selected remedial actions at the BLA and IAA sites at RFAAP-NRU, including:

- Removal of conductive flooring material from the remnants of seven former buildings at the BLA.
- Excavation of surface soils at the BLA to meet industrial/commercial level cleanup goals.
- Removal of conductive flooring material from the remnants of twenty-nine former buildings at the IAA.
- Excavation of surface soils at the IAA to meet residential level cleanup goals.
- Transportation and disposal of the flooring material and soils from the BLA and IAA to an appropriately licensed off-site disposal facility.
- Backfilling and restoration of the BLA and IAA sites.
- ICs that will be implemented at the BLA, IAA, and BDDT.

In addition to the technical details for the physical removal actions for the BLA and IAA, this RAWP also discusses the administrative activities required to complete the work such as construction management, quality assurance, health and safety.

1.2 Report Organization

This report includes the following sections:

- Section 2, RFAAP-NRU Facility Background, provides a physical location, historical description of the Site, and a summary of previous investigations;

- Section 3, Site Cleanup Levels and Remedial Action Objectives, presents the overall objectives and site cleanup levels that will guide the remedial activities;

- Section 4, Remedial Construction Activities, discusses the full scope of activities that will be completed during implementation of the remedial action, including: Site preparation, soil and conductive flooring removal, transportation and disposal of waste materials, Site restoration, institutional controls, and other Site activities;

- Section 5, Construction Quality Assurance, outlines the quality assurance activities that will be performed during implementation of the remedial actions;

- Section 6, Health and Safety, describes the health and safety procedures developed for the Site;

- Section 7, Reporting and Schedule, outlines the Remedial Action Completion Report that will be prepared upon completion of the Remedial Action and an anticipated schedule of the remedial activities; and

- Section 8, References, lists all documents referenced in this report.

2. RFAAP-NRU Facility Background

This section provides a brief summary of the site background information, including a history of the site investigations and risk assessments completed at the BLA, IAA, and BDDT sites at RAAP-NRU. The information presented in this section is discussed in much greater detail within the Remedial Investigation (RI) Report (ARCADIS, 2010a) and FS Report (ARCADIS, 2010b) for RFAAP-NRU.

2.1 Facility Location and History

The RFAAP-NRU facility is located in the mountains of southwestern Virginia in the Great Valley subprovince of the Valley and Ridge Physiographic Province. The RFAAP-NRU encompasses approximately 3,000 acres of Pulaski County, Virginia, near the town of Dublin (Figure 1-1). Active manufacturing operations at the facility ended in 1945, at the completion of World War II. The RFAAP-NRU currently serves as a storage facility for operations at the MMA. The storage facilities consist of magazine type buildings that are primarily located throughout the eastern portion of the RFAAP-NRU. Paved surface roads run throughout the facility to provide access to the storage magazines and areas utilized during historical operations at the site.

Despite the historical manufacturing operations that took place at the RFAAP-NRU, and its current use as a storage facility for the MMA, the majority of the land area consists of undeveloped grasslands, heavily forested areas, and agricultural tracts. A portion of the property has recently been converted for use as a military cemetery. The two areas utilized during the historical manufacturing operations, now identified as the BLA and the IAA, are reverting back to more natural conditions as trees, shrubs, and grasses have grown in the open areas of these sites. The BDDT is a stormwater drainage channel that had been previously utilized for the disposal of building debris, but now consists of a lined, rip-rap drainage swale. The BLA, IAA, and BDDT sites are both located in the western half of the RFAAP-NRU facility and encompass a small percentage of the total land area at the RFAAP-NRU.

With the exception of the storage magazines and a few maintenance/support buildings, very few active structures remain at the RFAAP-NRU. The buildings at the BLA and the IAA that were utilized during the historical manufacturing operations at the site have been largely dismantled. The wooden roofs and walls that were a part of the BLA and IAA structures have all been removed, leaving only concrete foundations and concrete blast walls. There are no buildings located at the BDDT.

2.1.1 Bag Loading Area

The BLA is located near the southwestern boundary of the RFAAP-NRU (Figure 2-1). The BLA ran two powder bag loading production lines from 1941-1943. Ten buildings were once located onsite; however, all process equipment, wooden roofs, and wooden walls have been removed from the buildings, leaving only concrete slabs and concrete walls. The concrete slab floors in seven of the buildings (including the second story floors of former Buildings 404 and 407) were covered in a conductive flooring material that contained various metals and asbestos. This flooring material was utilized to prevent the buildup of static electrical charges during historical operations at the site. The BLA site layout depicting locations of the former buildings and conductive flooring is presented as Figure 2-2. Removal of the walls and roofs of the buildings has exposed the conductive flooring to weathering, causing it to degrade and break away from the underlying concrete. In some cases, the flooring has degraded into a red powder-like material that has washed onto the surrounding surface soils.

Topography in the immediate vicinity of the BLA former buildings is relatively flat. Vegetation is mostly limited to grass and small shrubs, although several trees have also grown adjacent to several of the former buildings. Surface water is drained through a series of drainage ditches and culverts.

2.1.2 Igniter Assembly Area

The IAA is located in the western portion of the RFAAP-NRU (Figure 2-1). Buildings at the site were used for igniter assembly, as well as the shipping and receiving of materials related to the IAA. The main igniter assembly buildings (former Buildings 8102-1 through 8102-8) and multiple outparcel buildings at the IAA had a conductive flooring material similar to the BLA. In total, the remnants of 29 separate buildings at the IAA had conductive flooring material. The layout of the IAA site, including the locations of the former buildings with conductive flooring, is depicted in Figure 2-5. The buildings were constructed with conductive flooring to prevent build up of static electrical charges which could have potentially ignited explosive materials during assembly operations. This flooring material contains various metals and asbestos and was exposed to the weather when the wooden roof and walls were removed from the buildings. As a result, the conductive flooring has degraded into a red powder-like substance very similar to what has been observed at the BLA. In many areas, the degraded conductive flooring material has washed off the concrete pads onto surrounding surface soils.

The areas surrounding the main assembly buildings and multiple outparcel buildings are generally flat and vegetated with tall grass, shrubs, and pine trees. Previously maintained grassy areas have been allowed to revert to more natural conditions. An engineered drainage system around the IAA consists of a series of culverts to divert water to ditches which eventually drain into the unnamed creek that provides drainage for much of the RFAAP-NRU. However, the length of the unlined ditches suggests that runoff from normal rain events would infiltrate prior to arriving at the creek.

2.1.3 Building Debris Disposal Trench

The BDDT is located in the southern portion of the RFAAP-NRU (Figure 2-1). The trench was formerly an ephemeral unlined natural drainage channel that had eroded into the clay surficial soil. The trench channels surface water runoff from the surrounding area down the length of the trench towards an unnamed creek which passes through the area downgradient of the BDDT. An approximately 600 ft long portion of the natural depression formed by the trench was previously utilized for the disposal of miscellaneous building debris derived from the dismantling of various structures at the RFAAP-NRU. The building debris consisted of concrete, wood, and rusted and broken drums of a black, tarry substance believed to be roofing tar. The building debris and any visibly stained soil were removed from the trench during a 1998 site investigation. The excavated material was replaced with clean fill and the trench was lined with a geotextile fabric and filled with riprap to minimize the potential for erosion. The open area downgradient of the trench did not contain any debris and was not addressed during the 1998 site restoration activities. The area downgradient of the trench is covered with a thick grass groundcover and is a natural depositional area for any soils that would have washed out of the disposal trench prior to the site restoration. An aerial photograph of the BDDT area is included as Figure 2-8 that depicts the layout of the site.

Rolling, grass-covered hills with incised drainage channels provide the setting for the BDDT. The trench runs from north to south between two hills and is approximately 650ft long by 15 ft wide. The head of the trench begins at a culvert under one of the area roadways, at an approximate elevation of 2,000 ft above mean sea level (amsl) and slopes downward to the south ending an elevation of approximately 1970 ft amsl. The area downgradient of the trench widens into an open area between the two hills before ending at a small unnamed creek that runs through the southern portion of the RFAAP-NRU. The elevation of the creek bed downgradient of the BDDT is approximately 1960 ft amsl.

2.2 Nature and Extent of Contamination

Multiple phases of environmental investigations were performed at the BLA, IAA, and BDDT Sites between 1997 and 2010. A brief history of these investigations is presented in Table 2-1. The investigations provided for a comprehensive evaluation of the environmental conditions at the Sites through extensive sampling of surface soil, subsurface soil, sediment, surface water, groundwater, and building materials. The following subsections will present a brief discussion of the nature and extent of the constituents that were determined to be risk drivers (and thus drivers for remedial action) at the BLA, IAA, and BDDT Sites. A detailed discussion of the findings from all phases of investigation at the BLA, IAA, and BDDT is provided in the RI Report for RFAAP-NRU (ARCADIS, 2010a).

2.2.1 Bag Loading Area

Although many constituents were detected during the environmental investigations at the BLA, only a few constituents detected in surface soil were determined to present unacceptable health risks or hazards to current and/or hypothetical future receptors. The risk assessment for the BLA presented in the RI Report concluded that copper, lead, and asbestos detected in surface soil were constituents of concern (COCs) because they presented unacceptable risks and/or hazards to site workers and/or construction workers under the current and anticipated future industrial/commercial land use scenario. Under a hypothetical future residential land use scenario copper, lead, asbestos, Aroclor 1254 and benzo(a)pyrene were all determined to be COCs/risk drivers.

Lead, copper, and asbestos are all known components of the degraded conductive flooring material identified in the former buildings at the BLA. The presence of elevated concentrations of these constituents in surface soil samples collected at the site is believed to be primarily related to the degraded flooring material washing off the former building pads. Due to the relatively flat nature of the area around the buildings, the degraded flooring materials were not mobile after washing off the building pads. Visual evidence of the flooring material (i.e., red staining and loose debris) is generally confined to soils located within 2 feet of the building foundations, with the exception of a few surface water drainage pathways, where loose debris from the flooring material extends slightly further from the buildings. Extensive sampling conducted at the site has further confirmed that the highest concentrations of lead, copper, and asbestos are generally confined to surface soils located immediately adjacent to the former buildings. In most cases, the concentrations of lead and copper are lower than their

respective USEPA industrial and residential soil screening levels at distances greater than 1 to 2 feet from the foundation of the buildings. While there isn't a USEPA screening level for asbestos in soil, sampling performed at the site indicated that asbestos concentrations were less than 0.1% by weight at distances greater than 1 to 2 ft from the building foundation. Activity based sampling at the site indicated that at 0.1% by weight, asbestos in soil does not present an unacceptable risk to site receptors under the current industrial/commercial land use scenario or a hypothetical future residential land use scenario.

The polychlorinated biphenyl (PCB) compound Aroclor 1254 was detected in a few isolated surface soil samples collected adjacent to two former electrical transformer locations. Aroclor 1254 was detected at concentrations greater than its industrial soil RSL in one surface soil sample collected near a former transformer located to the east of former Building 416 and in two surface soil samples collected near a former transformer at the northwest corner of former Building 405. Aroclor 1254 was not detected at concentrations above industrial or residential screening levels in any other surface or subsurface soil samples collected in either area, which indicates that the elevated detections were confined to these two discrete areas.

The PAH compound benzo(a)pyrene was detected in surface soils at concentrations above industrial and/or residential soil RSLs in several areas of the site, including: adjacent to site buildings, roads, and the former elevated walkway platforms that connected the former buildings at the site.

Figure 2-3 depicts the copper, lead, Aroclor 1254, benzo(a)pyrene, and asbestos sampling results from the historical investigations at the BLA site. Figure 2-4 depicts the results of an extensive X-Ray Fluorescence (XRF) field screening program that was conducted to measure lead concentrations in surface soil around the former buildings at the BLA site.

2.2.2 Igniter Assembly Area

Like the BLA, many constituents were detected during the environmental investigations at the IAA. However, only a few constituents detected in surface soil were determined to present unacceptable health risks or hazards to current and/or hypothetical future receptors at the IAA. The risk assessment for the IAA presented in the RI Report concluded that the asbestos was the only COC in soil that presented an unacceptable risk to site workers under the current and anticipated future industrial/commercial land

use scenario. Under a hypothetical future residential land use scenario copper, lead, and Aroclor 1254 were determined to be risk drivers in addition to asbestos.

The degraded conductive flooring in the former buildings at the IAA is the same material that was utilized at the BLA and is known to contain lead, copper, and asbestos. The presence of elevated concentrations of these constituents in surface soil at the site is believed to be directly related to the degraded flooring material washing off the former building pads. Due to the relatively flat nature of the area around the buildings, the degraded flooring materials did not migrate in soil after washing off the building pads. Visual evidence of the flooring material (i.e., red staining and loose debris) is generally confined to soils located within 2 feet of the building edges, with the exception of a few surface water drainage pathways, where the flooring material migrated slightly further from the buildings. Extensive sampling conducted at the IAA has confirmed that the highest concentrations of lead, copper, and asbestos are generally confined to surface soils located immediately adjacent to the former buildings. In most cases, the concentrations of lead and copper are lower than their respective USEPA industrial and residential soil RSLs at distances greater than 1 to 2 feet from the edges of the buildings. The only area where the elevated lead and copper concentrations appear to extend further is near former Buildings 502 and 504 in the southern portion of the site. While there isn't a USEPA screening level for asbestos in soil, sampling at the site indicated that asbestos concentrations were less than 0.1% by weight at distances greater than 1 to 2 ft from the building edges. Activity based sampling at the site indicated that at 0.1% by weight, asbestos in soil does not present an unacceptable risk to site receptors under the current and reasonably anticipated future industrial/commercial land use scenario or a hypothetical future residential land use scenario.

Aroclor 1254 was detected at concentrations above USEPA industrial and residential soil RSLs in a few surface soil samples collected adjacent to former Buildings 502, 504, and 8101. Similar to the lead, copper, and asbestos detections, the soil samples exhibiting elevated Aroclor 1254 were all collected within a few feet of the former building foundations.

Figure 2-6 depicts the copper, lead, Aroclor 1254, and asbestos sampling results from the historical investigations at the IAA site. Figure 2-7 depicts the results of an extensive XRF field screening program that was conducted to measure lead concentrations in surface soil around the former buildings at the IAA site.

2.2.3 Building Debris Disposal Trench

The environmental investigations completed at the BDDT study area focused on identifying potential adverse impacts to surface soil and subsurface soil within the former debris area of the trench and the downgradient depositional area. The investigations also evaluated potential impacts to surface water and sediments in the stream located downgradient of the BDDT. Based on the findings of the investigation and risk assessments, benzo(a)pyrene was identified as a COC for soil in the former debris area as well as the downgradient depositional area. While benzo(a)pyrene was not found to pose unacceptable risks or hazards to site workers or construction workers, it was found to pose a potential unacceptable risk under a hypothetical future residential land use scenario. Cobalt was also found to present an unacceptable hazard under the hypothetical future residential land use scenario; however, the cobalt risks were driven by a single detection in soil that was likely naturally occurring and was therefore not considered a driver for remediation. No COCs were identified for sediments or surface water in the downgradient stream.

The elevated benzo(a)pyrene detections that drive the elevated risks for the hypothetical future resident, were detected in soils located underneath the portion of the site that is now covered with rip-rap, as well as in the downgradient depositional area that is now heavily vegetated. The source of the benzo(a)pyrene at the site, especially in the rip rap covered portion of the site, has been attributed to the debris that was formerly located in the trench. Soils that had been impacted within the debris area were transported and spread throughout the downgradient depositional area through erosion during heavy rainfall events. The debris and stained soils were removed from the site during 1998 site restoration activities; thus eliminating the source of COCs at the site. The 1998 site restoration activities also included the installation of a geotextile fabric liner and rip-rap within the trench which has prevented any additional erosion of soils within the trench. The thick vegetation that has grown throughout the gently sloped depositional area downgradient of the rip rap also has served to prevent erosion of impacted soils located in this area. Figure 2-9 depicts the benzo(a)pyrene sampling results from the historical investigations completed at the site.

3. Remedial Action Objectives and Clean-up Levels

This section presents the remedial action objectives (RAOs) and the numerical cleanup levels that will be utilized to guide the Remedial Actions at the BLA, IAA, and BDDT Sites.

3.1 Remedial Action Objectives

3.1.1 Bag Loading Area and Igniter Assembly Area

The BLA and IAA sites are very similar to each other in that the presence of degrading conductive flooring material and related surface soil impacts are the primary drivers for remedial action at both study areas. The risk assessments for the BLA and IAA have also indicated that unacceptable risks and/or hazards are present under both industrial and hypothetical residential land use scenarios. As such, the same general RAOs were developed for both study areas. The general RAOs for the BLA and IAA are to:

- Minimize the potential for future releases of COCs from the conductive flooring to the surrounding environment.
- Prevent human exposure to COCs in soil and the flooring material that could lead to an unacceptable risk or hazard for the designated use.
- Minimize the potential for COCs present in surface soils to migrate to other areas.

While the same general RAOs were established for the BLA and IAA, it should be noted that the final soil cleanup levels that have been selected for the two sites are different. The response action for soil at the BLA will target industrial cleanup levels, while the response action for the soil at the IAA will target residential cleanup levels.

3.1.2 Building Debris Disposal Trench

Based on the findings of the site investigations and risk assessment activities completed at the BDDT, benzo(a)pyrene in surface soil has been found to present unacceptable risks under a hypothetical future residential exposure scenario. Potential risks for the current and anticipated future industrial/commercial land use scenario were within the USEPA's generally acceptable range. Therefore, the RAOs for the BDDT are:

- Prevent human exposure to COCs in soil that would lead to unacceptable risks or hazards for the designated use.

- Minimize the potential for COCs present in surface soils to migrate to other areas.

3.2 Scope of the Response Actions

3.2.1 Bag Loading Area and Igniter Assembly Area

As presented in the FS (ARCADIS, 2010b) and the Proposed Plan (RFAAP, 2010), the Army selected similar response actions to achieve the RAOs for the BLA and IAA Sites. The selected response actions were:

- Alternative BLA/IAA SL-4: Excavation, Transportation, and Off-Site Disposal of Soils; and

- Alternative BLA/IAA CF-3: Removal and Off-Site Disposal of Asbestos Containing Flooring Materials.

The implementation of the selected response action for the BLA and IAA will consist of the following general actions:

- Removal and off-site disposal of all conductive flooring material present in the 7 former BLA buildings and 29 former IAA buildings. This will achieve the RAOs of preventing human exposure to the COCs in the flooring material and preventing future releases of degraded flooring material and associated COCs to soil.

- Excavation and off-site disposal of soils that contain COCs at concentrations that have been determined to present unacceptable risks to current or hypothetical future receptors. This will also include removal soils that contain visual evidence of residual flooring material (i.e., red staining and loose debris). The excavation activities will achieve the RAOs of preventing unacceptable human exposure to COCs and minimizing COC migration.

- Confirmation sampling to verify that the cleanup goals have been achieved.

- Site restoration activities to backfill and re-vegetate the site.

The only difference between the scope of the remedial actions at the BLA and IAA sites is that the soil excavation activities will be performed to achieve residential cleanup levels at the IAA site, whereas the excavation activities at the BLA site will be performed to achieve industrial cleanup levels. The reason for expanding the scope of the excavation to residential levels at the IAA is that the volume of soil to be excavated as part of a residential cleanup scenario is only marginally greater than the volume soil required to achieve an industrial closure. In addition, excavation of the IAA to residential cleanup levels will eliminate the need for institutional controls to be applied to soil at the IAA site. The volume of additional soil that would need to be excavated at the BLA site to achieve a residential level closure for that site is far greater than that required for the industrial closure scenario. Institutional controls will be maintained at the BLA site to limit future use/development to activities that will not result in unacceptable exposure to the COCs that remain in soil at the site.

Note that while ICs will not be required for soil or conductive flooring at the IAA upon completion of the remedial actions, ICs will still be necessary for the IAA to limit access to the building remnants due to residual lead-based paints and non-flooring asbestos-containing materials. The ICs that will be applied to the BLA sites will also note the limitations resulting from the presence of lead-based paints and asbestos-containing materials in the building remnants at that site.

3.2.2 Building Debris Disposal Trench

As presented in the FS (ARCADIS, 2010b) and the Proposed Plan (RFAAP, 2010), the Army selected the following response action for soils at the BDDT

- Alternative BDDT SL-2: Institutional Controls

The risk assessment conducted for the BDDT site concluded that the potential risks and hazards are within USEPA's generally acceptable risk range for the current and anticipated future industrial/commercial land use of the site. The existing erosion control measures (i.e., rip-rap lined trench and downgradient vegetation) effectively prevent erosion and migration of the surface soil. Therefore, removal actions or other active responses will not be required for the BDDT response action. The Institutional Controls that will be implemented for the site will simply prevent residential development of the site and ensure that erosion control measures are utilized to prevent migration of impacted surface soils. There will be no restrictions to industrial/commercial use of the property and there will be no health-based requirement to restrict or monitor intrusive activities.

3.3 Identification of Numerical Remedial Action Levels for Soil

Numerical Remedial Action Levels (RALs) have been established for the BLA and IAA Sites to guide their respective soil cleanup actions. The RALs are intended to serve as the soil clean up levels that will be achieved in order to meet the RAOs that have been set for the Sites. The Preliminary Remediation Goals (PRGs) that were presented in the FS and Proposed Plan for RFAAP-NRU have been adopted as the RALs. Because promulgated cleanup levels are unavailable for soil, PRGs were calculated using the site-specific exposure assumptions developed in the Baseline Human Health Risk Assessment. The PRGs were calculated to target an incremental risk of 10^{-6} for carcinogenic compounds, a HI of 1 for non-carcinogenic effects, or a fetal blood lead level of less than 10ug/dL for lead.

As stated previously, the goal of the excavation activities at the BLA is to reduce the estimated risks and/or hazards associated with the COCs in soil to levels that would be generally acceptable for industrial/commercial use. The risk assessment for the BLA site concluded that asbestos, lead, and copper in soil were the only risk drivers under an industrial land use scenario. The table below presents the RALs that have been developed for these constituents:

Remedial Action Levels for Soil at the BLA	
Driver	**BLA**
Copper	11,533 mg/kg
Lead	624 mg/kg
Asbestos	0.1% by weight

The goal of the excavation activities at the IAA will be to reduce the risks and/or hazards associated with the COCs in soil to levels that would be generally acceptable for residential use. The risk assessment for the IAA site concluded that levels of asbestos, copper, lead, and Aroclor 1254 in soil present unacceptable risks under a residential land use scenario. The table below presents the RALs that have been developed for these constituents:

Remedial Action Levels for Soil at the IAA	
Driver	**IAA**
Copper	3,043 mg/kg
Lead	400 mg/kg
Aroclor 1254	0.21 mg/kg
Asbestos	0.1% by weight

The goal of the conductive flooring material removal action is complete removal of the flooring material from all former site buildings. This will be achieved by visual inspection of the building pads; therefore it is not necessary to establish numerical RALs for the flooring removal action.

3.4 Attainment of Soil RALs

Due to the risk-based nature of the RALs for the BLA and IAA it is generally considered overly protective for the RALs to be utilized as "not-to-exceed" concentrations. Generally, the RALs should be utilized as "area average" concentrations for given exposure units (EU) in accordance with USEPA guidance (USEPA 1989 and 2005). An EU is a geographic area within which a receptor would be expected to come in contact with during a given exposure duration. The USEPA's Soil Screening Guidance (USEPA, 1996) recommends a 0.5-acre source area for residential exposures. Industrial site workers and other receptors would be expected to be exposed to contaminants across a larger area than a resident; therefore, a much larger EU would be utilized for those scenarios.

At the IAA where the objective of the remedial action is to achieve unrestricted residential land use for the soil an EU of 0.5 acres would be appropriate. However, the distribution of the COCs around the small discrete buildings and lack of residential development plans make it difficult to define this type of EU. Therefore, the RALs will be utilized as "not-to-exceed" cleanup levels with the understanding that in achieving RALs for confirmation samples will result in a post-remediation exposure level that is likely below the required cleanup level (USEPA, 2005).

At the BLA where the objective of the remedial action is to achieve land use that is restricted to industrial/commercial use, the EU would be site wide. As defined by USEPA (2005), an RAL is the maximum concentration that may be left in place within an exposure unit such that the predicted average concentration (i.e., Exposure Point Concentration [EPC]), or the 95% upper concentration limit (UCL) of the average, is at or below the Cleanup Level. Thus attainment of the RAL will be achieved and documented when the 95 % UCL of the confirmation samples collected during the soil excavation activities have concentrations at or below the RALs.

3.5 Response Action Areas

3.5.1 BLA Response Action Area

The degraded conductive flooring material located in the former buildings at the BLA has been identified as the primary source of the lead, copper, and asbestos in surface soil at the BLA site. Based on the condition and extent of the conductive flooring material, the Army has selected an aggressive remedial action to ensure that the material does not continue to release COCs to surrounding soils and to ensure that the flooring does not pose an unacceptable risk to future receptors at the site. This action will include the complete physical removal of all conductive flooring material (both degraded and intact sections) from the buildings and disposal of the material at an appropriately licensed off-site facility. Loose flooring material that has migrated off of the building pads onto the surrounding soils will also be collected and disposed of with the material from the buildings. Conductive flooring has been identified in a total of seven buildings at the BLA and covers an area of approximately 16,000 ft^2. Due to the presence of asbestos in the conductive flooring material, proper asbestos abatement methods will be utilized to perform this action in conformance with federal, state, and local regulations.

As discussed in previous sections, the response action for soil at the BLA site will be required to target areas that contain lead, copper, and asbestos at concentrations above the RALs that have been established for an industrial level closure. The response action that the Army has selected for these soils is excavation and disposal at an appropriately licensed off-site disposal facility. Based on extensive sampling conducted at the BLA site and visual observation of the soils that have been impacted by the flooring material, the bulk of the impacted soils are located immediately adjacent to the seven buildings with conductive flooring (i.e., former Buildings 404, 405, 406, 407, and 411 to 413 [see Figure 3-1]). More specifically, the soils that contain lead, copper, and asbestos at concentrations above their respective RALs are primarily located on the open sides of the buildings where there are pathways for the conductive flooring to have washed off of the building pads onto the adjacent soil. The distance to which the impacts extend from the buildings varies somewhat, but in general the target COC concentrations appear to be confined to surface soils located within 1 to 2 ft of the building edges. To ensure that the response action achieves the established RAOs, the excavation areas will include, at a minimum, surface soils (up to a depth of 1 ft) located within 2 feet of the open sides of the buildings with conductive flooring. The extent of the excavation will be expanded in areas where there is obvious visual staining or residue from the flooring material, and/or where confirmation samples

indicate the presence of lead, copper, and/or asbestos concentrations above their respective RALs. Soils on the closed ends of the buildings that have not been impacted by the flooring material will not be excavated. Construction Drawing #1 depicts the areas that will be included in the soil excavation activities. The final horizontal and vertical extent of the excavation will be determined by field analysis and confirmation sampling to ensure that the excavation is sufficient to achieve the RAOs (i.e., the 95% UCL concentration of the confirmation samples is less than the RALs).

3.5.2 IAA Response Action Area

Similar to the BLA, the primary source of the COCs identified for soil at the IAA is the degraded conductive flooring material in the site buildings. the Army has elected to perform a complete physical removal of the conductive flooring material (both degraded and intact sections) from the all site buildings and dispose of the material at an appropriately licensed off-site facility to ensure that the flooring material does not continue to release COCs to surrounding soils and that the flooring does not pose an unacceptable risk to future receptors at the site. Loose flooring material that has fallen off of the building pads onto the surrounding soils will also be collected and disposed of with the material from the buildings. Conductive flooring has been identified in a total of 29 buildings at the IAA and covers an area of approximately 25,000 ft^2. Due to the presence of asbestos in the conductive flooring material, proper asbestos abatement methods will be utilized to perform this action in conformance with federal, state, and local regulations.

Also similar to the BLA, the remedial action that has been selected for soil at the IAA is excavation and off-site disposal of the soils that are contributing to the unacceptable risks at the site. The excavation activities at the IAA will be performed to a residential cleanup level. The COCs in soil for this action are copper, lead, asbestos, and Aroclor 1254. The RALs for these constituents are listed in Section 3.3.

The presence of copper, lead, and asbestos in soil at elevated levels have been attributed to the degraded flooring material and as such the elevated concentrations of these constituents are generally confined to the areas located immediately adjacent to the open sides of the buildings where degraded conductive flooring has washed off of the building pads (see Construction Drawing #2). The distance to which the elevated COC concentrations extend from the former buildings varies somewhat, but extensive soil sampling data and visual observations of the extent of the flooring material in the soil indicates that the majority of the impacts are confined to surface soil within 2 feet of the building edges (See Figures 3-2 and 3-3). Therefore, the response action for soil

will, at a minimum, include excavation of surface soils (to a depth of 1 foot) located at distances of up to 2 feet from the open edges of the buildings with conductive flooring. The extent of the excavation will be expanded in areas where there is obvious visual staining or residue from the flooring material, and/or where confirmation samples indicate lead, copper, or asbestos concentrations above their respective RALs. Soils on the closed ends of the buildings that have not been impacted by the flooring material will not be excavated. Construction Drawing #2 depicts the areas that will be included in the soil excavation activities.

In addition to the excavation activities for copper, lead, and asbestos in soil, spot excavations will be required for the areas that were found to contain Aroclor 1254 at concentrations above its RAL. This will include a small area located near a former transformer location near Building 8101. It will also include a small area near former Buildings 502 and 504; however, the Aroclor 1254 detections near these two building pads appear to be co-located with the lead, copper, and asbestos response action area, so additional excavation may not be necessary. The final horizontal and vertical extent of the excavation will be determined by field analysis and confirmation sampling to ensure that the excavation is sufficient to achieve the RAOs (i.e., the COC concentrations in confirmation samples are less than the RALs)..

4. Remedial Construction Activities

This section provides a description of the components for the removal actions that will be completed at the BLA and IAA sites. These components include pre-construction and site preparation activities; conductive flooring removal; soil excavation; transportation and off-site disposal of conductive flooring and soil; confirmation sampling; and site restoration. Upon completion of the remedial activities, it will also be necessary to implement Institutional Controls (ICs) for the BLA site because the remedial activities will only be conducted to industrial levels for soil. Although the remedial activities for the IAA will be conducted to residential levels, ICs will also be required for the IAA due to residual lead-lead based paint and non-flooring asbestos containing materials. The ICs for the BLA and IAA sites are discussed in Section 5, along with the ICs that will be implemented for the BDDT.

4.1 Project Roles

4.1.1 Asbestos Abatement Contractor

ARCADIS will utilize the subcontract services of a qualified asbestos abatement contractor licensed in the Commonwealth of Virginia to perform the required site clearing, soil excavation and conductive flooring removal, and site restoration activities at the BLA and IAA sites.. A licensed asbestos abatement contractor, hereinafter referred to as the Contractor ,is required to perform this work due to the presence of asbestos in both the conductive flooring and soil at the BLA and IAA.

4.1.2 Oversight and Asbestos Project Monitoring

ARCADIS personnel will serve as the Site Remediation Manager or the remedial activities and will provide field oversight of the work activities. In this role, ARCADIS will be responsible for managing the Contractor and overseeing the successful performance of the work conducted at the BLA and IAA sites. ARCADIS will provide daily observations and documentation of the Contractor's work and progress. ARCADIS will provide direction to the Contractor as necessary, so that the scope of work is completed as budgeted and expected. ARCADIS will also enforce the health and safety requirements for the project and will collect confirmation samples to document that the remedial actions are completed to the prescribed levels. Prior to mobilization, ARCADIS will review and approve the Contractor's pre-job submittals which will include, but are not limited to, certifications, notifications, licenses, health and safety plan, and procedures. At the completion of the remedial activities, ARCADIS will

prepare a project completion report to document all remedial activities conducted at the BLA and IAA sites.

In addition to general project oversight, ARCADIS will provide full-time on-site asbestos abatement project monitoring during the asbestos abatement activities. As the asbestos project monitor, ARCADIS will collect air samples prior to, during, and following the abatement activities at each location to document the effectiveness of the contractor's work to ensure compliance with all applicable Federal, State and Local regulations.

As the project sites are not occupied and are not anticipated to be occupied following the abatement activities, it is not required to have an asbestos project monitor licensed in the Commonwealth of Virginia (18 VAC 15-20-455.1).

4.1.3 Waste Transportation and Disposal

Capitol Environmental Services, Inc., (Capitol), or another qualified waste broker, will coordinate transportation and disposal of soil, conductive flooring material, and other waste materials generated during performance of the work. Capitol will work with RFAAP-NRU and ARCADIS to ensure that all waste materials are properly documented/manifested and disposed of at Wayne Disposal, Inc., which is a Subtitle C facility located in Belleville, Michigan. The waste materials will be transported in accordance with all applicable Department of Transportation (DOT) regulations.

4.2 Pre-Construction Activities

The following activities will be completed prior to the intrusive activities at the BLA and IAA sites.

4.2.1 Contractor Notifications and Permits

The response actions for the BLA and IAA sites are being conducted under CERCLA; therefore, per Section 300.400(e) of the NCP, 40 C.F.R. § 300.400(e), no federal, state, or local permits are required for on-site response actions. However, all activities will be conducted in accordance with the substantive requirements of potentially applicable site permits (e.g., stormwater management and erosion and sediment control). ARCADIS and all subcontractors will obtain RFAAP permits prior to beginning work on-site.

Due to the presence of asbestos in the soil and conductive flooring material that will be removed during this response action, the Contractor will submit asbestos abatement project notifications to both the EPA Region III and Commonwealth of Virginia Department of Labor and Industry (DOLI). ARCADIS and the Army will review these materials before submittal.

The notification made to the Commonwealth of Virginia DOLI must be made prior to 20 calendar days ahead of the proposed mobilization date. The notification to EPA Region III must be made 10 business days prior to the proposed mobilization date. Refer to the Technical Specification 01070 provided in Appendix C for details.

4.2.2 Utility Clearance

A three point utility clearance will be performed prior to initiating any intrusive work at the Site. The three point utility clearance will consist of the following activities: (1) ARCADIS will coordinate with RFAAP to review the scope of work and identify any utility lines that may be located in the work areas, (2) a records review will be conducted to review all available drawings/information that can aide in identifying and locating adjacent underground utilities/structures, (3) a private utility locator (Mid-Atlantic Utility Locating, LLC) will be retained to locate underground lines/structures by applying surface geophysical methods in the areas where intrusive work will be conducted. Finally, ARCADIS will conduct a visual inspection of the work areas for marked subsurface utility locations, manholes, and other evidence of subsurface utilities.

4.2.3 Waste Characterization

Waste characterization samples will be required by the waste disposal facility (Wayne Disposal – Belleville, MI) prior to accepting the soil and conductive flooring material for disposal. Prior to the initial contractor mobilization, ARCADIS will collect separate composite waste characterization samples for the soil and the BLA and IAA. Composite samples will also be collected from the conductive flooring at the BLA and IAA. The soil and flooring samples will be analyzed for samples will be analyzed for TCLP metals, TCLP VOC, TCLP SVOCs, dioxins, PCBs, explosives, and asbestos Sample collection methods will be in accordance with the Master Work Plan and SOPs (URS, 2003).

4.3 Site Preparation

This section describes the manner in which ARCADIS and the Contractor shall maintain a controlled work site. The activities or requirements set forth by this section shall be applicable to all aspects of the site remediation activities.

4.3.1 Site Layout and Controls

Upon the initial mobilization to the site, ARCADIS and the Contractor will perform a thorough inspection the BLA and IAA sites to document existing conditions and review the required scope of work for the conductive flooring removal and soil excavation activities. ARCADIS and the Contractor will define access routes to the work areas, traffic flow patterns, asbestos regulated work areas, equipment staging areas, limits of disturbance, clearing requirements, and temporary waste staging and loading areas. Barrier tape will be erected at all access points to the BLA and IAA sites to limit site access throughout the duration of the response actions.

ARCADIS and the Contractor will also determine the location for a base of operation at the BLA and IAA sites during the initial mobilization. The base of operation will be utilized as the primary control center for the remedial activities being conducted at the site. Temporary facilities, including restroom and tool trailers will be located in this area.

4.3.2 Truck and Equipment Access/Egress Routes

Paved, gravel, and dirt surface roads run throughout RFAAP-NRU facility and provide access to the BLA and IAA sites and the majority of the areas where the response actions will be completed. Where possible, all vehicle traffic will remain on these roads. However, there are a few former buildings at the IAA that will require off-road traffic to access. The two larger buildings (former Buildings 404 and 405, see Figure 2-2) at the BLA site may also require off-road vehicle traffic to access areas that are located far from the roads. Vegetation, including large trees, will be removed in order to provide equipment/truck access to the work areas in these locations. ARCADIS will make every effort to minimize the number of trees that must be brought down to access the sites. In the event that the roads/paths used for site access/egress need improvement to accommodate dump trucks or other equipment used during the removal action, temporary gravel roads may be installed. The gravel layer would be placed on a non-woven geotextile fabric to provide support and allow for easy removal at the completion of the project. Construction Drawing #3 depicts typical section and details of a stabilized construction entrance and temporary access roads.

4.3.3 Clearing of Vegetation

It is anticipated that the selective removal of vegetation will be required from both the BLA and IAA sites to provide sufficient room for staging areas and accessing the work/excavation areas around the former buildings. Clearing of above ground vegetation will be conducted using hand tools and heavy equipment. After removal, the above ground vegetation will be temporarily staged, then chipped and spread on-site and left for decomposition. Grubbing of the site will not be required. Root stumps that are present within the excavation areas will be considered impacted by contaminated soil; and thus removed and disposed of accordingly during the excavation process (i.e., disposed of with the impacted soil to a properly permitted landfill). Clearing of vegetation shall be in conducted in conformance with Technical Specification 02110 – Vegetation Clearing provided in Appendix C.

4.3.4 Stormwater Management and Erosion and Sediment Control

Soil erosion and sediment controls as well as storm water management controls will be installed as necessary, to control all run-on and run-off at the site. Field conditions and on-site ARCADIS personnel will dictate what controls are required and at what locations. The controls may include, but are not limited to, silt fence, straw bales, temporary berms and/or ditches, and plastic sheeting. Proposed erosion and sediment control details are depicted in Construction Drawing #3. Once installed, controls will be inspected periodically and maintained throughout the remedial action. The controls will remain in place until the disturbed areas have been stabilized. All erosion and sediment controls shall be in accordance with Technical Specification 02290 – Erosion and Sediment Controls in Appendix C and the Virginia Erosion and Sediment Control Handbook (VADCR, 1992).

4.3.5 Decontamination Facilities

The Contractor will construct decontamination facilities for personnel and equipment that will be utilized during performance of the conductive flooring and soil excavation activities. Due to the presence of asbestos in the conductive flooring material and soil, the decontamination facilities for the site workers will consist of a decontamination chamber that will either be attached directly to contained conductive flooring removal areas or that may be adjacent to or near the soil excavation sites. The asbestos decontamination chamber will be designed to provide ingress and egress from the asbestos removal areas. It will provide a process for workers to remove contaminated coveralls and other personal protective equipment (other than respiratory protection) in

the dirty room, take a shower and/or wash exposed skin areas in the shower area, and then a separate clean room where street clothes can be put back on.

A temporary decontamination pad will be constructed for decontamination of trucks and equipment. Based on the small size of the excavations, it is not anticipated that earth moving equipment will need to enter the excavation area; thus only those parts of the equipment coming in contact with impacted soil will require decontamination (e.g., the excavator bucket). A mobile decontamination pad shall be used due to the layout of the work site precluding the use of decontamination pad fixed to one location. Construction drawing #3 presents the details of a temporary decontamination pad. The water utilized in the decontamination process will be filtered to remove the asbestos fibers then containerized. The decontamination water will be disposed of at Spirit Services in Hagerstown, Maryland.

4.4 Conductive Flooring Removal, Transportation, and Disposal

Due to the potential for spreading loose conductive flooring to the adjacent soils during performance of the remedial activities, the conductive flooring material will be removed from the former site buildings prior to the soil excavation work. The following sections discuss the activities that will be conducted for the conductive flooring removal action at the BLA and IAA sites.

4.4.1 Isolation of Removal Work Areas

Due to the presence of friable asbestos materials, the conductive flooring abatement work areas will be isolated by the construction of a temporary plastic enclosure that will be maintained under negative pressure with the use of air filtration units equipped with High Efficiency Particulate Air (HEPA) filtration. Isolation of work area will be conducted in conformance with Technical Specification 01070 – Asbestos Containing Material Abatement and Disposal (Appendix C).

Prior to performance of the flooring removal activities, ARCADIS will visually inspect each work area enclosure to document that they have been properly constructed and are functioning properly in accordance with the specifications and applicable regulations.

4.4.2 Flooring Removal Procedure

Following approval of the work area enclosures, the Contractor will remove the conductive flooring using wet methods and prompt clean up. While the exact methods and procedures for removing the conductive flooring material will be determined by the Contractor, the flooring removal activities will include an initial removal of loose/easily recoverable materials and debris, followed by a subsequent fine cleaning of the underlying concrete to remove any residual materials. All intact and degraded conductive flooring materials located in the 7 former buildings at the BLA and the 29 former buildings at the IAA will be removed during this action. Removal of conductive flooring shall be conducted in accordance with federal, state, local regulations and in accordance with Technical Specification 01070 – Asbestos Containing Material Abatement and Disposal. In addition, the removal of conductive flooring shall be in conformance of the safety requirements presented in the Contractors health and safety plan and Appendix A (Accident Prevention Plan).

4.4.3 Flooring Waste Temporary Storage, Transportation, and Disposal

All conductive flooring and waste materials generated during the flooring removal action will be stored inside two separate asbestos-specific waste storage bags. The storage bags shall be OSHA-approved 6-mL thick plastic waste bags designed for the specific use of asbestos waste disposal. The waste will be maintained adequately wet and double-bagged. Refer to Technical Specification 01070 provided in Appendix C for details. The waste bags will be temporarily staged inside the contained work area or in a secured trailer or temporary storage facility until prepared for transport to the off-site disposal facility. Due to the presence of friable asbestos, the material will be disposed of at licensed asbestos disposal facility.

4.4.4 Air sampling

Prior to performance of the flooring and soil removal activities, ARCADIS will collect pre-abatement air samples to document prevalent airborne asbestos fiber concentrations for comparison to air samples collected during the abatement and excavation activities as well as final clearance air samples.

During performance of the flooring removal activities, ARCADIS will collect air samples at each work area to document the presence or absence of airborne fibers outside and inside the work area enclosures. If necessary, the air samples will be compared to the

pre-abatement air sample results to determine if a fiber release has occurred related to the contractor's work.

Each of the air samples will be collected and analyzed by the National Institute of Occupational Safety and Health (NIOSH) 7400 Method, Phase Contrast Microscopy (PCM). This method does not differentiate between asbestos and non-asbestos fibers. If necessary, PCM air samples may be reanalyzed by Transmission Electron Microscopy (TEM) which has a higher resolution and can differentiate between asbestos and non-asbestos fibers.

A summary of the various samples that will be collected during the remedial actions at the BLA and IAA is presented in Table 4-1.

4.4.5 Confirmation Sampling Program

The sampling activities presented in Section 4.4.5 shall be conducted in accordance with Technical Specification 01070 – Asbestos Containing Material Abatement and Disposal.

4.4.5.1 Final Visual Inspection

To document that the conductive flooring material is successfully removed from BLA and IAA buildings, each flooring removal work area will be visually inspected by the ARCADIS project monitor in general accordance with ASTM E1368. The visual inspection will determine the presence of visible remaining flooring material, dust, and/or debris. If flooring material, dust or debris are observed, the contractor shall re-clean those areas until no visible flooring material, dust, or debris are observed. Once the visual inspection passes, ARCADIS will document this event and initiate final clearance air sampling.

4.4.5.2 Final Clearance Air Sampling

Prior to dismantling the temporary flooring removal area enclosures, ARCADIS will collect a representative number of final clearance air samples to determine the airborne fiber concentrations inside the contained work areas. If each of the final clearance air samples measure equal to or less than 0.01 fibers per cubic centimeter of air (f/cc), then the contained work area will be released for dismantling. If any one of the final clearance air samples measure above 0.01 f/cc, ARCADIS will determine if the air sample should be re-analyzed by TEM which has the capability to differentiate

asbestos fibers from non-asbestos fibers. However, ARCADIS may also elect to have the contractor re-clean the containment and re-collect the final clearance air samples.

4.5 Soil Excavation, Removal, Transportation, and Disposal

The soil excavation activities for the BLA and IAA sites will proceed following completion of the conductive flooring removal actions. The following sections discuss the activities that will be conducted for the required soil excavation, transportation, and disposal at the BLA and IAA sites.

4.5.1 Pre-Excavation Survey

Once the conductive flooring removal activities have been completed at the BLA and/or IAA, ARCADIS will clearly mark the planned boundaries of the excavation activities with marking paint and flagging. At a minimum, the excavation boundaries will extend along the open sides of the former buildings at the BLA and IAA sites, where there was a pathway present for the flooring materials to have been released to the soil (see Construction Drawings #1 and #2). In most cases, the excavation boundary will extend to a distance of 2 feet from the building edges. However, the boundaries will be extended from the edges of the buildings in areas where there are obvious visual indications that the soil has been impacted by the degraded conductive flooring material. The boundaries of the excavation will also be extended in areas where historical sampling has indicated COC concentrations above the applicable RALs for the site.

In addition to the areas around the buildings with conductive flooring, a small area near former Building 8101 at the IAA will be included in the excavation footprint for that site due to the historical detection of Aroclor 1254 at a concentration above the established RAL for residential soils (see Construction Drawing #2).

The planned excavation footprint for the BLA site is presented in Construction Drawing #1 and the planned excavation footprint for the IAA site is presented in Construction Drawing #2. While the excavation boundaries are similar for the BLA and IAA sites, it should be noted that the soil action for the BLA is intended to achieve an industrial end use, while the IAA activities are intended to achieve an unrestricted/residential end use.

4.5.2 Isolation of Soil Excavation Work Areas

OSHA-approved asbestos warning barrier tape will be erected surrounding the excavation work areas to restrict access. A decontamination chamber for site workers will be constructed in the vicinity of the excavation area. .

ARCADIS will visually inspect each excavation work area prior to performance of the required excavation activities to document that they have been properly isolated in accordance with the specifications and applicable regulations.

4.5.3 Soil Excavation Removal Procedures

The approximate footprint of the excavation activities for the BLA and IAA sites are depicted in Construction Drawings #1 and 2, respectively. The planned depth of the excavation activities at the BLA and IAA sites is 1 ft bgs. The final horizontal and vertical limits will be determined in the field through visual observation of soils (for flooring related impacts) and the confirmation sampling program.

The bulk of the excavation work will be performed using conventional mechanical earth moving equipment. However, hand digging may be required immediately adjacent to some of the buildings to ensure complete removal of the target soils. If possible, the tracks of the excavation equipment will stay outside the footprint of the excavation areas and/or truck loading area to minimize the potential transport of impacted soils from the work areas.

In order to minimize handling of impacted material, the excavated soil will be loaded directly onto dump trailers or roll-offs when possible for transport to the off-site disposal facility. If necessary to expedite the pace of work, small piles of soil may be temporarily staged within or adjacent to the footprint of the excavations; however, the staged materials shall not exceed the volume of one dump trailer load. Any stockpiles that are formed will be placed on 10-ml polyethylene tarps to prevent re-contamination of the previously excavated areas. Temporarily staged soil piles awaiting disposal shall be kept wet and covered with plastic sheeting to prevent dust and/or asbestos releases.

4.5.4 Dust and Asbestos Control

Water will be used as a primary engineering control to reduce fugitive airborne dust and asbestos fiber emissions prior to and during the excavation activities. Water will also be

utilized to prevent emissions from temporary soil staging areas. Water for dust and asbestos control will be obtained from clean (potable) sources. Dust monitoring will be implemented in accordance with the Accident Prevention Plan (Appendix A) and Technical Specifications (Appendix C).

4.5.5 Temporary Storage, Transportation, and Disposal of Soil and Waste Materials

When possible soils designated for off-site disposal will be placed directly into dump trailers or roll-off containers. Once a truck is fully loaded, the soil load will be re-wetted to prevent dust and asbestos emissions. The soil will then be covered with polyethylene-coated tarps or other suitable covers that are properly secured for transport. Trucks shall be inspected and loose soil on the exterior of the truck will be removed prior to leaving the truck loading area.

A vehicle log denoting when each truck has entered and left the site will be maintained and will include each truck's identification number, driver identification, the times of arrival and departure, and the approximate volume of material hauled. The soil will then be transported by Capitol Environmental, Inc., to a fully-permitted Subtitle C disposal facility (Wayne Disposal). A representative from RFAAP will review, approve, and sign waste profiles and manifests prior to the disposal of soil from the site.

Transportation of the impacted soil will be conducted in accordance with the applicable regulations, including the requirements of the DOT and Technical Specification 02250 – Transportation and Disposal (Appendix C). Materials transporters will be appropriately licensed, permitted, and in compliance with all applicable regulations. The waste disposal contractor will submit copies of all manifests to the ARCADIS representative. Copies of the final waste manifests and weigh tickets will also be provided to ARCADIS upon receipt of the material at the disposal facility

Waste materials generated during performance of the excavation activities (e.g., PPE) will be placed in OSHA-approved asbestos waste storage containers. This waste will be moved and stored in a secured trailer or temporary storage facility until transported off site for disposal.

4.5.6 Air Sampling

Prior to excavation activities, \pre-abatement air samples will be collected to document prevalent airborne fiber concentrations for comparison to air samples collected during abatement and excavation activities as well as final clearance air samples.

Air samples will be collected at each work area during the excavation activities to document the presence or absence of airborne fibers outside and inside the work areas. If necessary, the air samples will be compared to the pre-abatement air sample results to determine if a fiber release is or has occurred related to the contractor's work.

Each of the air samples will be collected and analyzed by the National Institute of Occupational Safety and Health (NIOSH) 7400 Method, Phase Contrast Microscopy (PCM). This method does not differentiate between asbestos and non-asbestos fibers. If necessary, PCM air samples may be reanalyzed by Transmission Electron Microscopy (TEM) which has a higher resolution and can differentiate between asbestos and non-asbestos fibers.

The air samples for the soil excavation work areas will be collected in upwind and downwind locations relative to the excavation work area.

4.5.7 Soil Confirmation Sampling Program

Soil samples will be collected from the perimeter and base of the excavated areas to verify that the response actions successfully encompassed the soils where COCs were present at concentrations above the applicable RALs. The samples collected around the BLA and IAA buildings will be field screened for copper and lead using a NITON Model XLT792 XRF analyzer, or equivalent. Because asbestos is assumed to be co-located with copper and lead; the field screening results for copper and lead will be used as a surrogate indicator for asbestos. Approximately 10 percent of the field samples will be submitted for laboratory analysis of lead and copper by USEPA Method 6010 and asbestos by TEM using USEPA method 600/R-93/116 with sample preparation using California Air Resource Board (CARB) Method 435. The laboratory results will be used to confirm the XRF field screening results and the success of the removal action. The asbestos laboratory samples will be analyzed on a 24-hour turn-around time.

Aroclor 1254 was identified as a target COC for soils in certain areas of the IAA (i.e., former transformer location near Building 8101 and near former Buildings 502 and 504). Therefore the confirmation soil samples collected in these areas will also be submitted for laboratory analysis of Aroclor 1254 using USEPA Method 8082b.

In the event that the field screening or laboratory analytical results indicate that COCs are present at the IAA at concentrations above the RALs and where the 95 %UCL

COC concentrations in the confirmatory samples collected from the BLA is greater than the RAL, the excavations will be expanded as follows:

1. For excavation perimeter samples that exceed the target RALs, the excavation will be expanded a distance of two feet, perpendicular to the sidewall of the excavation. The lateral extent of the excavation expansion shall extend from the exceeding sample location to the mid-way point between the next compliant sample location.

2. For excavation base samples that exceed the target RALs, the depth of the excavation will be expanded by 6 inches at the corresponding sample location. The lateral extent of the excavation expansion shall extend from the exceeding sample location to the mid-way point between the next compliant sample location.

3. The excavation expansions will be terminated when the results of the confirmation sampling program indicate COC concentrations at each of the sample locations are achieve the applicable RALs.

Soil samples will be collected in accordance with the sampling procedures outlined in the Master Work Plan for the RFAAP (URS, 2003). QA/QC samples will be collected in accordance with the Draft Quality Assurance Plan Addendum (QAPA) (ARCADIS, 2008b). A summary of the various samples that will be collected during the remedial actions at the BLA and IAA is presented in Table 4-1.

4.6 Site Restoration

4.6.1 Backfill

Once the final vertical and horizontal excavation limits have been achieved, the areas at the BLA and IAA that have been excavated shall be backfilled utilizing clean imported fill. Common borrow soil shall be placed in loose 1 ft loose lifts and be compacted to a visually acceptable standard using standard construction equipment. Common borrow shall be placed up to 0.5 ft bgs, with the remaining 0.5 ft of fill consisting of topsoil suitable for the establishment of a vegetative layer. The final grade of the Site shall be constructed so that it promotes positive drainage and does not create erosion features.

Backfill material shall be certified clean fill and analyzed for the presence of the following (one test per 1,000 CY):

- VOCs (USEPA Method 8260);
- SVOCs (USEPA Method 8270);
- TAL Metals (USEPA Method 6010B)
- Pesticides/Herbicides (USEPA Method 8081A); and,
- PCBs (USEPA Method 8082B).

Results of the analyses will be compared to the USEPA's Regional Screening Levels for Residential Soils. The backfilling and other earthwork activities associated with the site restoration shall conform to the requirements of Technical Specification 02200 – Earthwork (Appendix C).

4.6.2 Revegetation and General Site Restoration

Upon completion of the construction activities, the site shall be restored. Site restoration shall include the following:

- Regrade and reseed soil disturbed during construction.
- Repair roads damaged during construction activities.
- Remove the decontamination pads, stabilized construction entrances, silt fence, and any other items associated with the remedial activities.
- Remove all temporary facilities from the site.

All damages to the Site resulting from the remedial activities shall be repaired in kind. The revegetation activities shall be conducted in accordance with Technical Specification 02936 – Establishment of Vegetation in Appendix C.

5. Land Use Controls

Land use controls (LUCs) have been identified as part of the selected remedies for the BLA and IAA. LUCs/ICs will also be utilized as the primary response action for the BDDT. This section discusses the LUCs that will be established to assure that land use remains safe and is protective of human health and the environment.

Soil excavation activities that will be performed at the IAA will remove COCs at levels above the residential soil PRGs resulting in clean closure and unrestricted future use for the site. Therefore no institutional controls for soils at the IAA will be required.

The soil excavation activities that will be performed at the BLA site are only intended to target areas where copper, lead, and asbestos are present at concentrations that present unacceptable risks under an industrial/commercial land use and excavation scenarios. Constituents including benzo(a)pyrene, Aroclor 1254, lead and copper will be left in place at concentrations in BLA soils that were found to present unacceptable risks under a hypothetical future residential land use scenario. Therefore, LUCs/ICs will be implemented to prevent residential use of the site. Although the baseline risk assessment also indicated that asbestos would present a risk to hypothetical future residents at the BLA, the asbestos cleanup levels that will be achieved during the response action will be protective for future residents.

The conductive flooring removal actions that will be performed at the BLA and IAA sites will meet the flooring-related RAOs that have been established for both sites; thus there will be no basis for restricting land use at either site due to conductive flooring. However, the building remnants at both sites will still contain some residual lead-based paint and asbestos containing materials unrelated to the flooring that will require the Army restrict access to the former buildings at the BLA and IAA.

The remedial investigations and risk assessments for the BDDT concluded there are no unacceptable risks associated with the current and anticipated future industrial/ commercial use of the site. However, there are unacceptable risks associated with benzo(a)pyrene in surface soil at the site under a hypothetical future residential land use scenario. Therefore, LUCs/ICs will be implemented to prevent residential use of the property and minimize the potential for benzo(a)pyrene present in surface soils to migrate to other areas.

5.1 Purpose

The purpose of this section is to document the short and long term actions needed to implement, report on, maintain and enforce the LUC portion of the remedy selected in the Decision Document for the BLA, IAA and BDDT sites. The LUC activities outlined in this section will be handled by the Army's contractor (ARCADIS until March 2016), except where otherwise noted.

The Site inspections and reporting requirements described herein will be effective immediately upon approval of this RAWP by VDEQ. Once put into effect, the requirements set forth in this document will remain applicable to the BLA and IAA sites during Army and subsequent ownership of the Site should there be any.

5.2 Land Use Control Performance Objectives

The following LUCs performance objectives for the BLA, IAA, and BDDT will be met by implementation of LUCs. The LUCs objectives include the following:

- Prohibit the development and use of the BLA and BDDT sites for residential housing, elementary and secondary schools, child-care facilities and playgrounds;
- Prohibit the occupation or use of building remnants within the BLA and IAA for industrial or commercial purposes including storage and warehousing; and
- Minimize the potential for COCs present in surface soils to migrate to other areas by controlling erosion.

5.3 Land Use Control Implementation

A Land Use Control Implementation Plan (LUCIP) will be prepared for RFAAP-NRU to define responsibilities and procedures for implementing, managing, enforcing and tracking land use controls. The primary objective of the LUCIP will be to prevent residential use of the BLA and BDDT and restrict access to BLA and IAA building remnants. Access restrictions are in place at RFAAP by virtue of it being an active military installation. However, in the event that RFAAP-NRU closed and was declared excess property, the LUCIP will require the land use restrictions be legally recorded (e.g., in zoning ordinances, property deeds, etc.) and incorporated into the provisions for the new land use. As a RFAAP-specific GIS database has not been established,

the LUCIP will also record the boundary coordinates for the BLA and IAA land use controls. The land use controls for the IAA and BLA will include the following actions:

- As on most military facilities, access regulations are in place at the New River Unit of RFAAP. The NRU is enclosed in perimeter fencing and access to the NRU is limited to authorized personnel only. The existing perimeter fence that surrounds the RFAAP-NRU facility will continue to be maintained in accordance with the existing requirements for this active energetics storage facility.

- An information sign will be installed at the main entrance to RFAAP-NRU (i.e., gate 20) to inform site workers and visitors of the restrictions to land use at the facility.

- Annual inspections will be performed to ensure that the BLA and BDDT property is not utilized for residential purposes and that the information signs and fence are properly maintained. Inspections will also be performed to ensure that the rip-rap liner and downgradient vegetation at the BDDT remain in place to prevent erosion/migration of surface soils that contain COCs. The inspections will be documented with CERCLA 5-Year Reviews.

The requirement for preventing residential development of the BLA and BDDT sites and access restrictions to former buildings at the BLA and IAA will be in place in perpetuity, unless a future remedial action is conducted at the site (including lead and asbestos abatement of the buildings) that can document that constituent concentrations at the site no longer present unacceptable risks under a residential land use scenario. There are no other restrictions for the site. Generally allowable uses include current industrial / commercial and recreational use. In addition, there are no health-based restrictions for intrusive activities (e.g., utility maintenance or repair). Other than the information sign, there will be no maintenance requirements for the site.

6. Construction Quality Assurance

Quality control/quality assurance (QA/QC) for this investigation will be handled in accordance with the Master QAPP (URS, 2003) as amended by ARCADIS' QAPA. The ARCADIS QAPA describes sample management, analytical procedures, quality control checks, and data validation.

6.1 Data Quality Objectives for Measurement Data

The Data Quality Objectives (DQOs) for the soil sampling program is to assure that the limits of the excavation are sufficient to achieve the RAOs.

In addition to the qualitative DQOs, the analyses conducted will also conform to the project DQOs pertaining to field sampling methodology and laboratory-specific DQOs referenced in the Master QAPP.

6.2 Measurement/Data Acquisition

Field, laboratory, and data handling procedures relating to activities performed at RFAAP-NRU will conform to the specific requirements detailed in the Master Work Plan (MWP) or in the SOPs as identified below.

Subject	MWP Section	SOP(s)
Sample management	5.1	50.1, 50.2, 50.3
Documentation	4.3	10.1, 10.2, 10.3, 10.4
XRF Screening	-	30.11
Soil Sampling	5.2.8	30.1, 30.7, 30.9
Decontamination Requirements	5.12	80.1

6.3 Assessment/Oversight

Assessment and oversight activities for this site will be conducted in accordance with the ARCADIS QAPA.

6.4 Data Validation and Usability

Level III data validation for samples collected and analyzed from RFAAP-NRU will be conducted in accordance with Section 9.5 of the Master Work Plan (URS, 2003) and the ARCADIS QAPA in Appendix A.

6.5 Asbestos Removal Quality Control

ARCADIS will provide direct oversight and management of the Contractor to ensure that the scope of work is completed as specified and contracted, and in accordance with applicable federal, state, and local regulations. The ARCADIS asbestos abatement project monitor will be directed and supervised by an ARCADIS Principal Scientist and will be available for consultation and assistance when needed.

Air sampling equipment will be properly maintained and calibrated in accordance with industry standards and the NIOSH 7400/7402 methods.

PCM air samples will either be analyzed onsite by a qualified ARCADIS asbestos abatement project monitor that has successfully completed the NIOSH 582 PCM Air Sampling and Analysis course or equivalent or sent to a qualified outside laboratory that is accredited by the American Industrial Hygiene Association (AIHA) and National Voluntary Laboratory Accreditation Program (NVLAP). Both the ARCADIS analyst and outside laboratory analysts will be proficient in analyzing PCM air samples by the NIOSH 7400 method as determined by successful participation in the AIHA Proficiency Analytical Testing (PAT) program for PCM analysis or registration in the AIHA Asbestos Analyst Registry (AAR).

When TEM confirmatory analysis is required, the outside laboratory will be accredited by both AIHA and NVLAP for TEM analysis by the NIOSH 7402 method.

7. Health and Safety

ARCADIS and the Contractor will adhere to applicable federal, state, and local OSHA regulations in regards to performing the scope of work in a safe manner. Based upon the anticipated and measured exposures to asbestos, the appropriate level of personal protective equipment (PPE) will be selected and used to provide adequate protection from the identified hazards.

The Contractor will provide a Site Specific Health and Safety Plan (SS-HASP) that will identify the anticipated potential hazards associated with the scope of work and project site. The SS-HASP will then be reviewed and updated, when necessary, if additional potential hazards are identified that were not initially anticipated. In addition, all phases of the remedial activities shall be conducted in accordance with the Accident Prevention Plan presented in Appendix A.

8. Reporting and Schedule

ARCADIS anticipates that the field components of the response actions discussed in this report will be conducted over an 8 to 10 week period, beginning in October 2010. Once the analytical data for the confirmation samples have been received from the laboratory and the waste disposal manifests have been received from the disposal facility, a completion report will be prepared summarizing the full details of the response actions completed at the BLA and IAA. This report will include:

- Field notes and daily logs;
- Tabulated quantities of excavated soil and flooring;
- Field and laboratory analytical data from confirmation sampling program;
- Soil and conductive flooring waste disposal information;
- Photographic documentation of the field activities; and
- Documentation of any deviations from this Work Plan.

The Completion Report will be submitted to VDEQ and will be utilized to document that the stated RAOs have been achieved for the BLA and IAA sites. The overall schedule for the BLA and IAA response actions is presented in Appendix D.

9. References

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Tables

Table 2-1
Summary of Previous Investigation
Radford Army Ammunition Plant
Radford, Virginia

Investigation	Date	Media	Analytes
Bag Loading Area			
Dames & Moore	1997	Soil	Inorganics
Gennett Flemming Independent Sampling	1997/1998	Soil/Conductive Flooring	Asbestos, Explosives, Inorganics, Pesticides, PCBs, SVOCs, VOCs
Shaw Remedial Investigation	2002	Soil/Sediment/Surface Water	Explosives, Herbicides, Inorganics, Pesticides, PAHs, PCBs, SVOCs, VOCs
Shaw Soil Sampling	2005	Soil/Conductive Flooring	Asbestos
ARCADIS Remedial Investigation	2008	Soil	Asbestos, Inorganics, TCLP Metals, PCBs, SVOCs
ARCADIS Supplemental Remedial Investigation	2009	Soil/Air	Asbestos
Igniter Assembly Area			
Dames & Moore	1997	Soil	Inorganics, Pesticides, PCBs, SVOCs
Dames & Moore	1998	Soil	Pesticides, PCBs, SVOCs
Gennett Flemming Independent Sampling	1997/1998	Soil/Conductive Flooring	Asbestos, Explosives, Inorganics, Pesticides, PCBs, SVOCs, VOCs

Table 2-1
Summary of Previous Investigation
Radford Army Ammunition Plant
Radford, Virginia

Investigation	Date	Media	Analytes
ICF KE Remedial Investigation	1998	Soil	Explosives, Inorganics, SVOCs
Shaw Remedial Investigation	2002	Soil	Explosives, Herbicides, Inorganics, Pesticides, PAHs, PCBs, SVOCs, TCLP metals, VOCs
Shaw Soil Sampling	2005	Soil/Conductive Flooring	Asbestos
ARCADIS Remedial Investigation	2008	Soil	Asbestos, Inorganics, TCLP Metals, PCBs, SVOCs
ARCADIS Supplemental Remedial Investigation	2009	Soil/Air	Asbestos
Building Debris Disposal Trench			
Alliant Techsystems Preliminary Sampling	1997	Soil/Tar/Surface Water	SVOCs, TCLP SVOCs
Gannett Fleming Independent Sampling	1998	Sediment/Surface Water	VOCs, SVOCs, PCBs, Explosives, Inorganics
ICF Kaiser Engineers Remedial Investigation	1998	Soil/Sediment/Surface Water	VOCs, SVOCs, PAHs, Explosives, Inorganics
Shaw Remedial Investigation	2002	Soil/Sediment/Surface Water	VOCs, PAHs, PCBs, Pesticides, Herbicides, Inorganics

Table 2-1
Summary of Previous Investigation
Radford Army Ammunition Plant
Radford, Virginia

Investigation	Date	Media	Analytes
Shaw Additional Characterization	2004	Soil	PAHs, PCBs
ARCADIS Remedial Investigation	2008	Soil/Sediment/Surface Water	PAHs

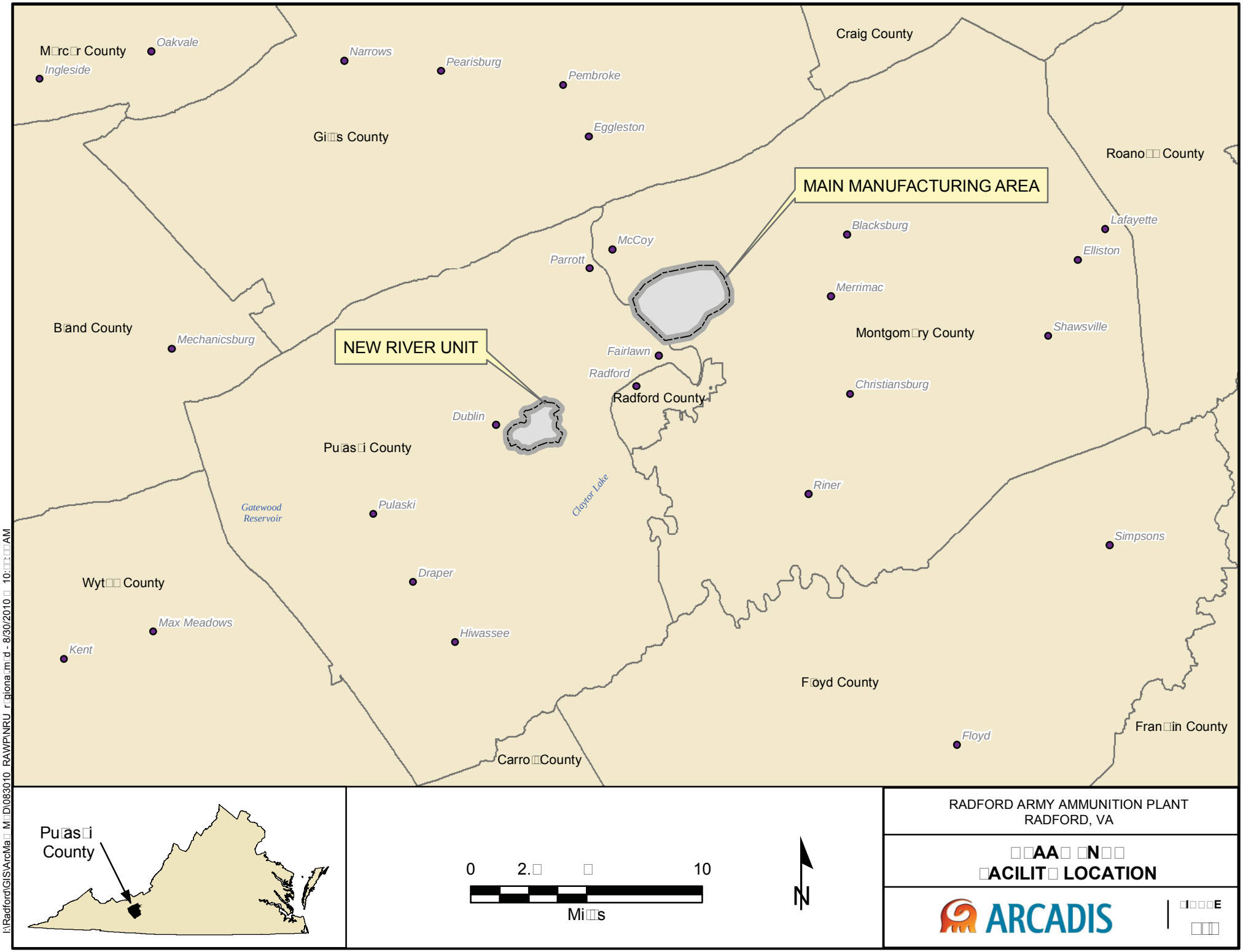
Table 4-1
Field Investigation Summary
Radford Army Ammunition Plant
Radford, Virginia

Field Investigation	Investigation Methodology	Frequency of Samples (Planned)	Sample Media	Analysis (Method)	Sample Numbering
Pre-abatement Air Sampling (PCM)	Pre-abatement asbestos fiber samples collected to establish an ambient condition prior to abatement	5 per building pad	Air	PCM (NIOSH 7400)	BLAPCM(Date)-0XX IAAPCM(Date)-0XX
Abatement Air Sampling (PCM)	Asbestos fiber samples collected during the conductive flooring abatement; sample collected from both inside and outside the enclosures	7 per building pad / per day	Air	PCM (NIOSH 7400)	BLAPCM(Date)-0XX IAAPCM(Date)-0XX
Post-abatement Air Sampling	Post-abatement (prior to dismantling air enclosure) samples collected to verify effectiveness of abatement	7 per building pad	Air	PCM (NIOSH 7400)	BLAPCM(Date)-0XX IAAPCM(Date)-0XX
Air Sampling (TEM)	Samples may be potentially by TEM if the PCM reading was above 0.01 f/cc	TBD	Air	TEM (NIOSH 7400)	TBD
Waste Characterization Sampling	TBD by accepting waste disposal facility	none	soil	TBD by waste disposal facility	BLAWC0XX IAAWC0XX
Post-Excavation Confirmation Samples; XRF	Field samples collected after planned excavation extent has been attained to confirm that the soil removal action was successful	1 sample collected on 20 ft centers	Soil	BLA: Cu, Pb (EPA 6010b) IAA: Cu, Pb (EPA 6010b)	BLAXRF(depth)-0XX IAAXRF(depth)-0XX
Post-Excavation Confirmation Samples; Lab analytical	Soil samples collected after lab analyzed to verify usability of XRF field samples.	10% of XRF samples	Soil	BLA: Cu, Pb (EPA 6010b) IAA: Cu, Pb, (EPA 6010b) Aroclor 1254 (EPA 8082)	BLACS(depth)-0XX IAACS(depth)-0XX
Decon Water	Collect 1 per container	~2	Water	TBD by waste disposal facility	WW(Date)
QC Samples: 1. Field Duplicate – Soil	Soil samples submitted blind to laboratory	5% lab samples	Soil	BLA: Cu, Pb (EPA 6010b) IAA: Cu, Pb, (EPA 6010b) Aroclor 1254 (EPA 8082)	BLADUP(Date) IAADUP(Date)
2. Field Duplicate – Air	PCM samples submitted blind to laboratory	10% lab samples	Air	PCM (NIOSH 7400)	BLAPCMDUP(date) IAAPCMDUP(date)
3. Rinsate Blank	Equipment Blank	1/day	Water	Cu, Pb, (EPA 6010b) Aroclor 1254 (EPA 8082)	EB(Date)

NOTES:

TBD: to be determined,
Cu – Copper
Pb – lead
TEM – Transmission Electron Microscopy
PCM – Phase Contrast Microscopy
NIOSH – National Institute of Occupation Safety and Health
USEPA – United States Environmental Protection Agency

Figures and Construction Drawings


M□rc□r County
Oakvale
Ingleside
Narrows
Pearisburg
Pembroke
Craig County
Gi□s County
Eggleston
Roano□□ County
MAIN MANUFACTURING AREA
Blacksburg
Lafayette
McCoy
Elliston
Parrott
Merrimac
B□and County
Mechanicsburg
NEW RIVER UNIT
Montgom□ry County
Shawsville
Fairlawn
Radford
Christiansburg
Radford County
Dublin
Pu□as□i County
Riner
Gatewood Reservoir
Pulaski
Claytor Lake
Simpsons
Draper
Wyt□□ County
Max Meadows
Hiwassee
Kent
F□oyd County
Floyd
Fran□in County
Carro□County
Pu□as□i County
0
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10
Mi□s
N
RADFORD ARMY AMMUNITION PLANT
RADFORD, VA
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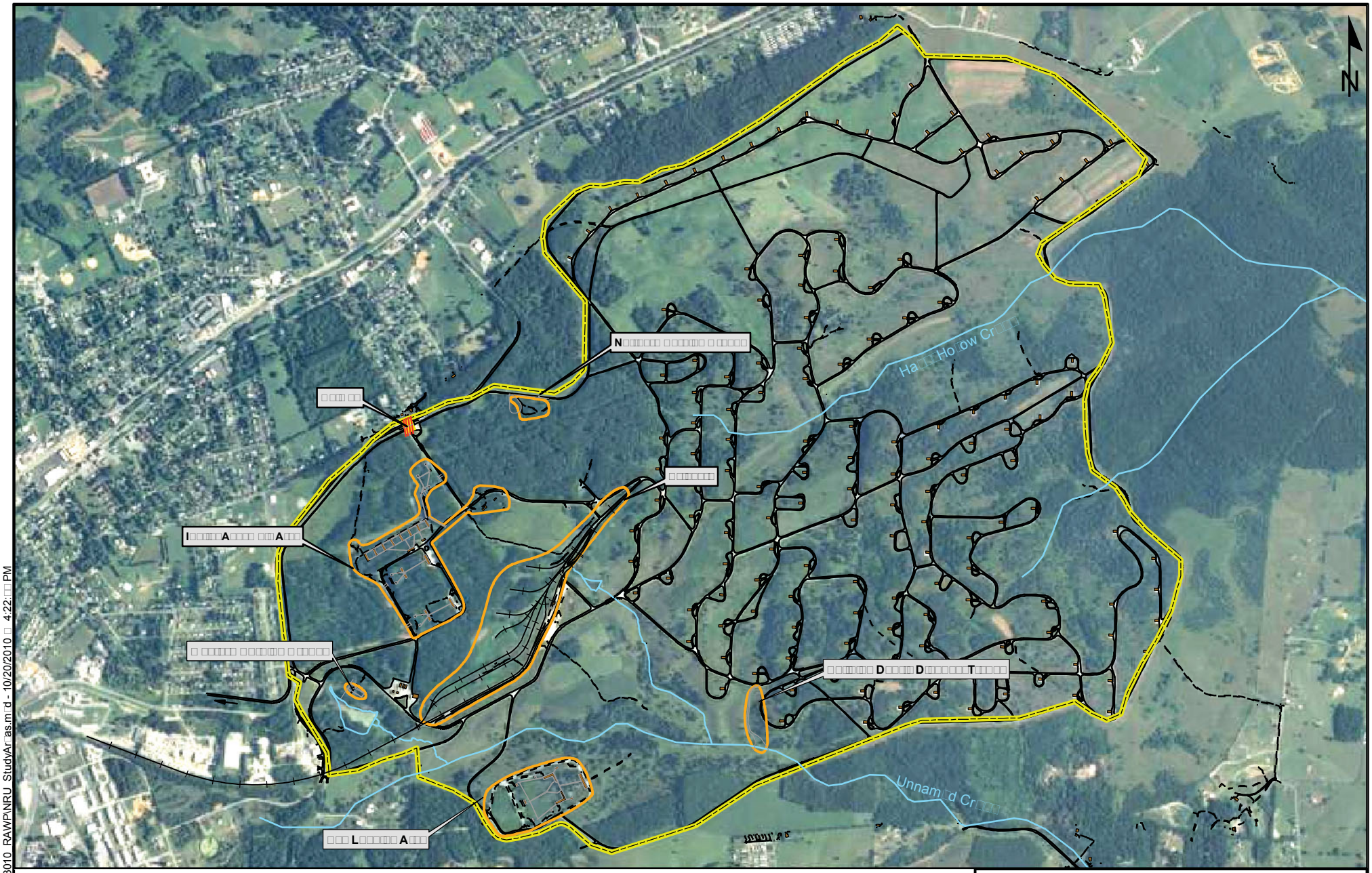
N
Ha Ho ow Cr
Unnam d Cr
LEGEND
SITE FEATURES
RAIL SPUR
SURFACE WATER
PAVED ROADS
DIRT ROADS
STUDY AREA
NRU BOUNDARY
FORMER BUILDINGS
NOTES:
1. GIS SPATIAL LAYERS OBTAINED FROM SHAW ENVIRONMENTAL, INC. AS REFERENCED IN THEIR REPORT TITLED NRU ADDITIOANL CHARACTERIZATION SAMPLING & GROUNDWATER INVESTIGATION DATA REPORT IN OCTOBER 200
0
900
1,800
F t
GRAPHIC SCALE
RADFORD ARMY AMMUNITION PLANT
RADFORD, VA
AA N
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ARCADIS
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PAVED ROADS
DIRT ROADS
SITE FEATURES
SURFACE WATER
FORMER RAISED WAL□WAY PLATFORMS
STUDY AREA
INSTALLATION BOUNDARY

FORMER BUILDINGS
NO CONDUCTIVE FLOORING
YES CONDUCTIVE FLOORING

NOTE:
BUILDINGS 404 AND 40□ WERE TWO STORY BUILDINGS

0 200 400
F□□t
GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

□A□ LOADIN□ A□EA
SITE LA□O□T

ARCADIS

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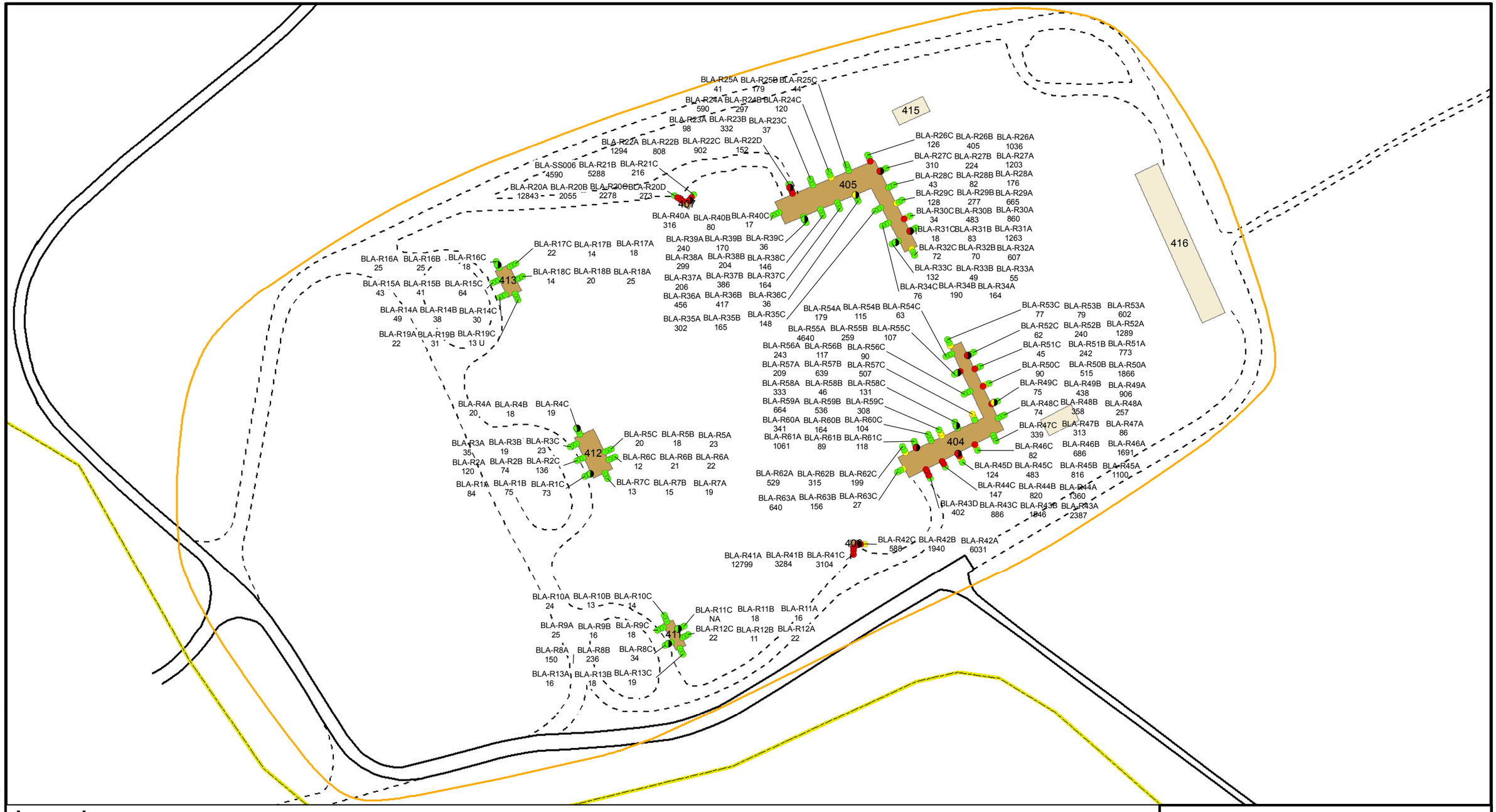

Legend

XRF LEAD SCREENING RESULT

- <400 MG/KG
- 400 - 750 MG/KG
- >750 MG/KG
- ASBESTOS PRESENT IN SAMPLE

- SITE FEATURES
- WALKWAY
- DIRT ROADS
- PAVED ROADS
- STUDY AREA

- INSTALLATION BOUNDARY

FORMER BUILDINGS

- NO CONDUCTIVE FLOORING
- YES CONDUCTIVE FLOORING

NOTES:
DISTANCE FROM BUILDINGS:
A: 1 FOOT (CLOSEST TO BUILDING)
B: 5 FEET
C: 10 FEET
D: 15 FEET (FARTHEST FROM BUILDING)

0 130 260 Feet

GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

XRF SAMPLE LOCATIONS AND RESULTS BAG LOADING AREA

ARCADIS

FIGURE 2-4

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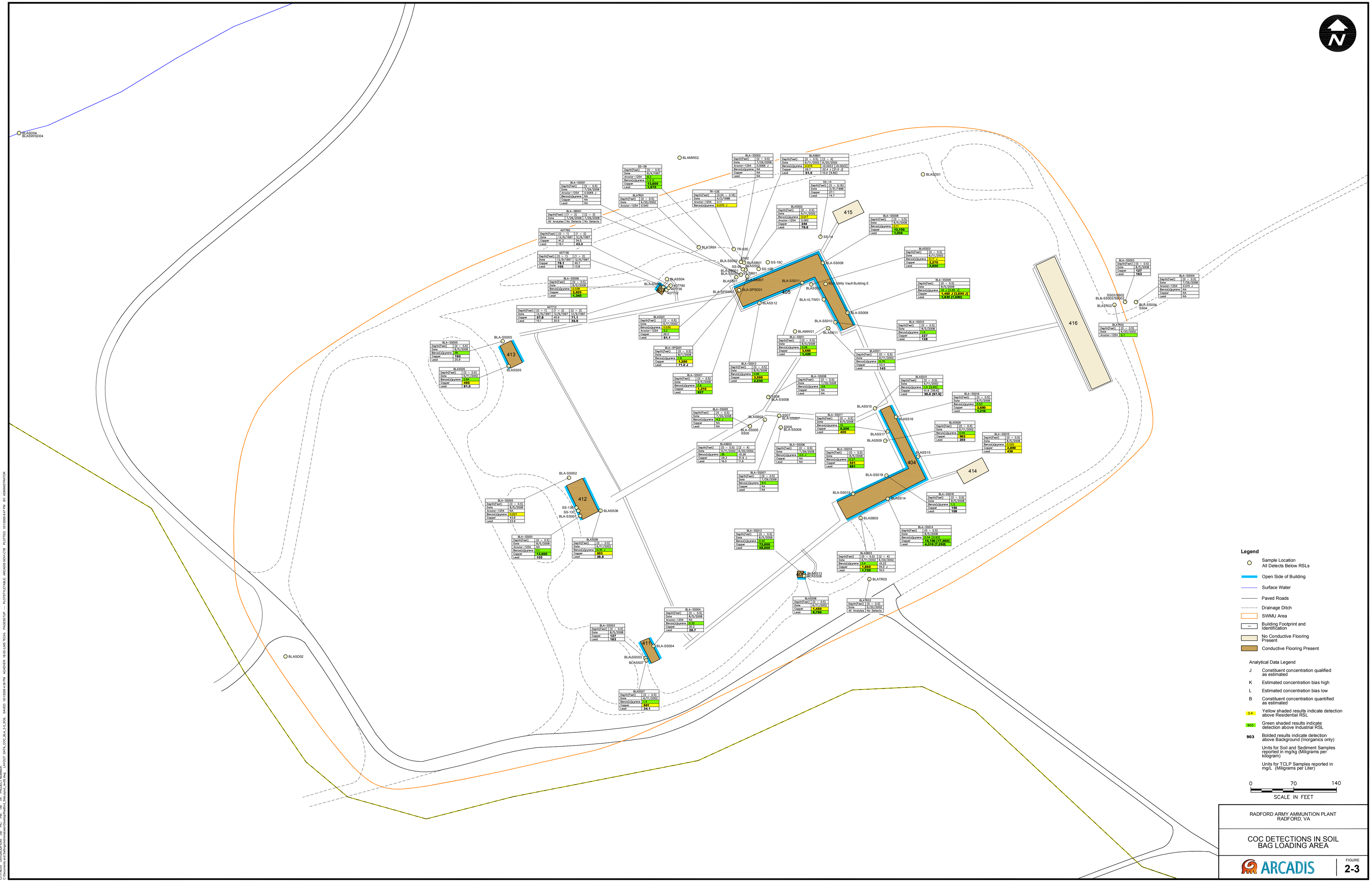
BLASD04
BLASWSD04
BLAMW02
BLASD01
BLA-SS001
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Arsolor-1254 0.0069 J
Benzo(a)pyrene NA
Copper NA
Lead NA
BLA-SB001
Depth(Feet) (0 – 2) (2 – 3)
Date 7/29/2008 7/29/2008
All Analytes | No Detects | No Detects
407783
Depth(Feet) (0 – 1) (1 – 2)
Date 12/9/1997 12/9/1997
Copper 41.2 34.5
Lead 16.1 43.3
407736
Depth(Feet) (0 – 1) (1 – 2)
Date 12/9/1997 12/9/1997
Copper 76.1 40.3
Lead 105 13.8
BLA-SS006
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.538
Copper 1,420
Lead 1,340
407713
Depth(Feet) (0 – 1) (1 – 2) (2 – 3)
Date 12/9/1997 12/9/1997 12/9/1997
Copper 1210 24.1 14.1
Lead 15.1 20.5 35.9
BLA-SS005
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.0
Copper 192
Lead 25.9
BLASS05
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.94
Copper 490
Lead 81.6
BLA-SS002
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Arsolor-1254 0.0068 J
Benzo(a)pyrene NA
Copper NA
Lead NA
BLA901
Depth(Feet) (0 – 0.5)
Date 6/20/2002
Arsolor-1254 0.040
TR-035
Depth(Feet) (0.04 – 0.16)
Date 4/2/1998
Arsolor-1254 0.11
Benzo(a)pyrene 0.075 J
BLASS02
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.057
Arsolor-1254 0.060
Copper 244
Lead 79.9
SS-14
Depth(Feet) (0 – 0.16)
Date 3/31/1998
Copper 27.1
Lead 14.1
BLA-SS008
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.13
Copper 15,100
Lead 1,050
BLASS03
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.114
Copper 1,210
Lead 2,850
BLA-SS009
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 1.4
Copper 1,440 [1,850 J]
Lead 1,830 [1,060]
BLA-SS003
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Copper 127
Lead 183
BLA-SS004
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 0.076 J
Copper NA
Lead NA
BLA902
Depth(Feet) (0 – 0.5)
Date 6/20/2002
Arsolor-1254 0.7
BLA-SS001
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.530
Copper 30.2
Lead 61.1
BLA-SS010
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 1.6
Copper 227
Lead 128
BLA-SP001
Depth(Feet) (0 – 0.5)
Date 6/7/2008
Benzo(a)pyrene 1.5
Copper 1,480
Lead 11.0 J
BLA-SS011
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.0
Copper 1,440
Lead 1,430
BLASS11
BLASS12
BLA-SS007
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 2.1
Copper 1,810
Lead 97
BLA-SS012
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 1.1
Copper 1,590
Lead 2,230
BLA-SS008
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Copper NA
Lead NA
BLASS10
BLASS16
BLASS17
BLASS09
BLASS15
BLA-SS005
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Benzo(a)pyrene 0.27
Copper NA
Lead NA
BLA-SS017
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.0
Copper 2,200
Lead 445
BLASS10
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 10 [10.05]
Copper 51.6 [52.4]
Lead 95.6 [97.9]
BLA-SS016
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.55
Copper 3,690
Lead 1,210
BLASS02
BLA-SS005
SS05
BLA-SS007
BLA-SS006
BLA-SS008
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Benzo(a)pyrene 0.27
Copper NA
Lead NA
BLA-SS009
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.0
Copper 1,440
Lead 265
BLA902
Depth(Feet) (0 – 0.5)
Date 6/20/2002
Arsolor-1254 0.7
BLA-SS003
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Copper 127
Lead 183
BLA-SS004
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 0.076 J
Copper NA
Lead NA
BLA-SS015
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 1.6
Copper 3,690
Lead 439
BLA-SS018
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.0
Copper 150
Lead 109
BLA-SS014
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Benzo(a)pyrene 0.0
Copper 4,190 [17,900]
Lead 4,110 [7,250]
BLA-SS002
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 NA
Benzo(a)pyrene 0.027
Copper 43.5
Lead 23.9
BLA-SS001
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 NA
Benzo(a)pyrene 11
Copper 13,000
Lead 105
BLASS06
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.39 J
Copper 903
Lead 30.8
BLA-SS003
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Copper 183
Lead 183
BLA-SS004
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 NA
Benzo(a)pyrene 0.53
Copper 30.2
Lead 28.7
BLASS03
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.0
Copper 1,200
Lead 55,000
BLASS13
BLASS08
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Copper 1,450
Lead 8,760
BLASB03
Depth(Feet) (0 – 0.5) (4 – 4)
Date 6/11/2002 6/20/2002
Benzo(a)pyrene 3.9 <0.22
Copper 1,950 14.0 J
Lead 1,720 19.0
BLASB03
Depth(Feet) (0 – 0.5)
Date 6/20/2002
All Analytes | No Detects
BLASS03
BLASS07
BLASS04
BLA-SS013
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Benzo(a)pyrene 0.27
Copper 551
Lead 691
BLA-SS007
Depth(Feet) (0 – 0.5)
Date 7/29/2008
Benzo(a)pyrene 0.4
Copper NA
Lead NA
BLA-SS002
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 NA
Benzo(a)pyrene 0.027
Copper 43.5
Lead 23.9
BLA-SS001
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 NA
Benzo(a)pyrene 11
Copper 13,000
Lead 105
BLASS06
Depth(Feet) (0 – 0.5)
Date 6/11/2002
Benzo(a)pyrene 0.39 J
Copper 903
Lead 30.8
BLA-SS003
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Copper 183
Lead 183
BLA-SS004
Depth(Feet) (0 – 0.5)
Date 6/5/2008
Arsolor-1254 NA
Benzo(a)pyrene 0.53
Copper 30.2
Lead 28.7
BLASS03
BLASS07
BLASD02
BLASD03
BLASD04
BLASD05
BLASD06
BLASD07
BLASD08
BLASD09
BLASD10
BLASD11
BLASD12
BLASD13
BLASD14
BLASD15
BLASD16
BLASD17
BLASD18
BLASD19
BLASD20
BLASD21
BLASD22
BLASD23
BLASD24
BLASD25
BLASD26
BLASD27
BLASD28
BLASD29
BLASD30
BLASD31
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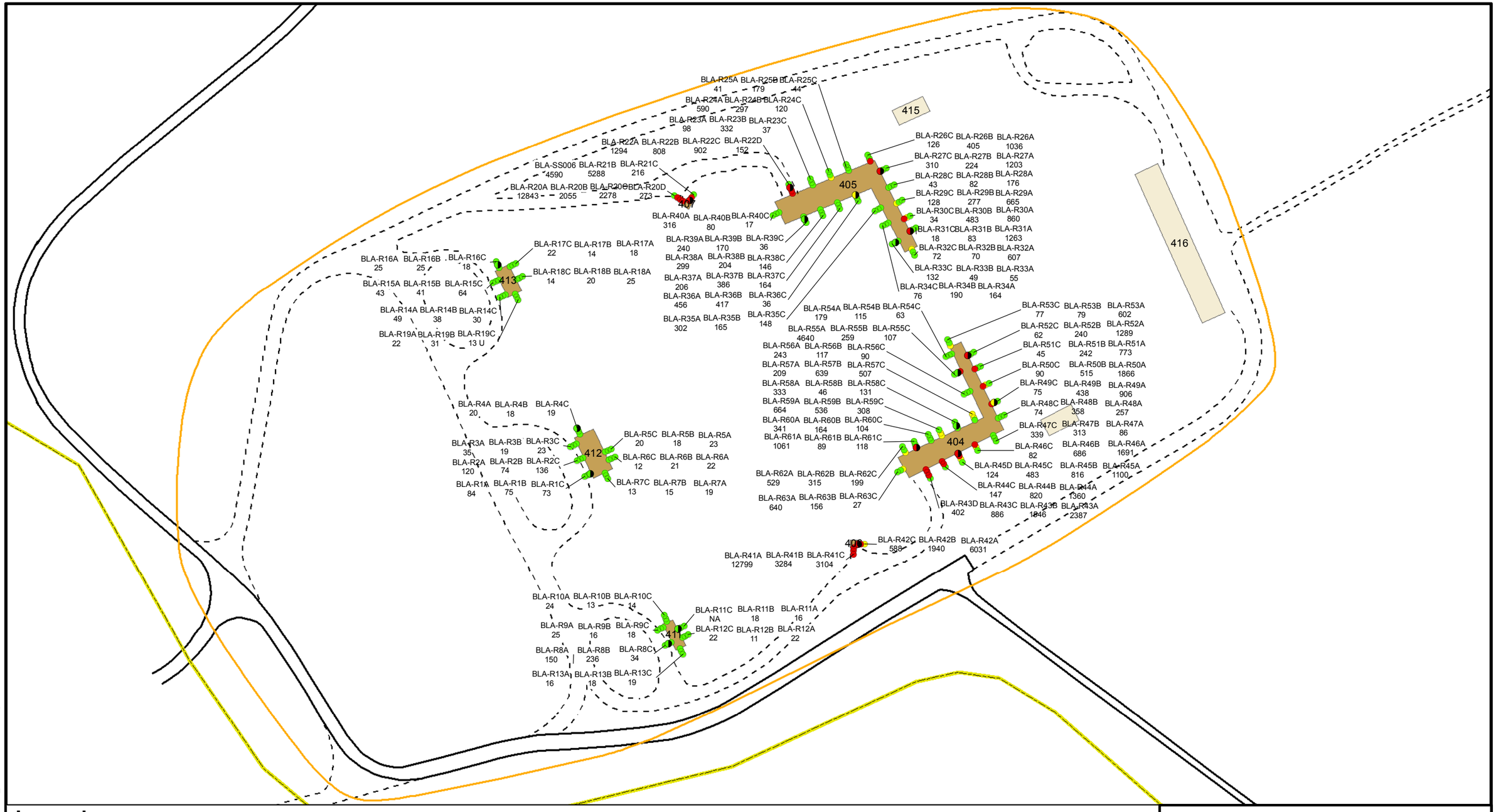
BLASD40
BLASD41



Legend

XRF LEAD SCREENING RESULT

- <400 MG/KG
- 400 - 750 MG/KG
- >750 MG/KG
- ASBESTOS PRESENT IN SAMPLE

- SITE FEATURES
- WALKWAY
- DIRT ROADS
- PAVED ROADS
- STUDY AREA

- INSTALLATION BOUNDARY

FORMER BUILDINGS

- NO CONDUCTIVE FLOORING
- YES CONDUCTIVE FLOORING

NOTES:
DISTANCE FROM BUILDINGS:
A: 1 FOOT (CLOSEST TO BUILDING)
B: 5 FEET
C: 10 FEET
D: 15 FEET (FARTHEST FROM BUILDING)

0 130 260 Feet

GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

XRF SAMPLE LOCATIONS AND RESULTS BAG LOADING AREA

ARCADIS

FIGURE 2-4

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LEGEND

- SEWER LINE
- SITE FEATURES
- RAIL SPUR
- SURFACE WATER
- CULVERT
- PAVED ROADS
- DIRT ROADS
- FORMER BUILDINGS
  - NO CONDUCTIVE FLOORING
  - YES CONDUCTIVE FLOORING
- STUDY AREA
- INSTALLATION BOUNDARY

0 340 680 Feet

GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

IGNITEABILITY AREA
SITE LAYOUT

ARCADIS

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N

IAA-SS040 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 139 J
IAA-SS040
IAA-SS041 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 302 J
IAA-SS041
IASD04
IATR01 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IATR01
IAA-SS042 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 199 J
IAA-SS042
IASD05
IAA-SS043 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 46.7 J
81022660 | Depth(Feet) (0 – 1) (1 – 2) | Date 12/11/1997 12/11/1997 | Lead 13.9 13.5
81022612 | Depth(Feet) (0 – 1) (1 – 2) (2 – 3) | Date 12/11/1997 12/11/1997 12/11/1997 | Lead 10.7 11.4 11.5
IAA-SS043
IATP1A/C | Depth(Feet) (0.5 – 1) (0.5 – 4.5) | Date 8/4/1998 8/4/1998 | Lead 41.7 L 7.00
IAA-SS006 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 121 J
IATP1B/D | Depth(Feet) (0.5 – 1) (0.5 – 4.5) | Date 8/4/1998 8/4/1998 | Lead 11.8 L 6.40
81022636 | Depth(Feet) (0 – 1) (1 – 2) | Date 12/11/1997 12/11/1997 | Lead 10.5 13.3
IASB12 | Depth(Feet) (0 – 0.5) (4 – 6) (8 – 10) | Date 6/10/2002 6/18/2002 6/18/2002 | Lead 22.2 20.7 J 23.9 J
IASB1 | Depth(Feet) (0.5 – 1) (5 – 6) | Date 8/5/1998 8/5/1998 | Lead 14.1 10.9
IAA-SS003 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 82.9 J
IACF2
IACF1
IATP1B/D
IATR1A/C
IAA-SS003
IAA-SS005 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 122 J
IAA-SS004 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 26.1 J
IAA-SS006
IAA-SS005
IASB12
IAA-SS004
IAA-SS008
IASD06
IAA-SE-001
IAA-SE-002
IASB2 | Depth(Feet) (0 – 2) (4 – 6) (26 – 28) | Date 8/5/1998 8/5/1998 8/5/1998 | Lead 8.50 8.30 11.5
IAA-SS009 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 1,170 J
IATR02 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IAA-SS008 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 92.4 J
IAA-SE002 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 31.8 J
IAA-SS011 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 270 J
IATR02
TR-01A
TR-01B
IASB2
IAA-SS009
IAA-SS010 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 31.3 J
IAA-SS007 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 33.6 J
IAA-SE001 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 35.0 J
IASB3 | Depth(Feet) (0.5 – 1) (5 – 6) | Date 8/5/1998 8/5/1998 | Lead 21.8 16.4
IAA-SS011
IAA-SS010
IAA-SS007
IATR04 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IASB3
IAA-SS013 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 184 J
IAA-SS012 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 14,400 J [7,760 J]
IAA-SS013
IAA-DUP001
IAA-SS012
IATR04
IAA-SE004
IAA-SE003
IAA-SS014 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 567 J
IAA-SE004 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 31.9 J
IASB11 | Depth(Feet) (0 – 0.5) (2 – 4) | Date 6/10/2002 6/18/2002 | Lead 66.2 14.7 J
IAA-SE003 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 44.4 J
IAA-SS002 | Depth(Feet) (0 – 0.5) | Date 7/29/2008 | Aroclor-1254 0.090
IAA-SS001 | Depth(Feet) (0 – 0.5) | Date 7/29/2008 | All Analytes No Detects
IAA-SB001 | Depth(Feet) (2 – 3) | Date 7/29/2008 | All Analytes No Detects
IASS05 | Depth(Feet) (0 – 0.5) | Date 6/10/2002 | Aroclor-1254 19 | Lead 31.1
IASS04 | Depth(Feet) (0 – 0.5) | Date 6/10/2002 | Lead 144
IAA-SS015 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 98.0 J
IASB10 | Depth(Feet) (0 – 0.5) (2 – 4) | Date 6/10/2002 6/18/2002 | Lead 29.7 27.2 J
IAA-SS016 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 32.6 J
IASS02 | Depth(Feet) (0 – 0.5) | Date 6/10/2002 | Lead 49.1
IASS01 | Depth(Feet) (0 – 0.5) | Date 6/10/2002 | Lead 30.2
IAA-VLTW01
IAA-SS032
IAA-SS033 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 905 J
IAA-SS032 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 898 J
IAA-SS031 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 38.0 J
IAA-SS034 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 294 J
IATR05
IATR05 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IAA-SS030 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 23.4 J
IASD09
IATR07 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IATR07
IASD07
IATR06 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IATR06
IASB13 | Depth(Feet) (0 – 0.5) (1 – 2) (2 – 4) | Date 6/11/2002 6/18/2002 6/18/2002 | Aroclor-1254 0.12 <0.040 <0.040 | Lead 458 23.6 J 116
504312 | Depth(Feet) (0 – 1) (1 – 2) (2 – 3) | Date 12/11/1997 12/9/1997 12/9/1997 | Aroclor-1254 0.59 P ND 0.046 P | Lead 4,090 15.4 18.5
IASB14
504360
504312
504
IASB15
IAA-SS026
IASB14 | Depth(Feet) (0 – 0.5) (1 – 2) (2 – 4) | Date 6/11/2002 6/18/2002 6/18/2002 | Aroclor-1254 0.050 [0.070] <0.030 <0.040 | Lead 1,480 [1,380] 24.3 J 29.0 J
IASB15 | Depth(Feet) (0 – 0.5) (1 – 2) (2 – 4) | Date 6/11/2002 6/18/2002 6/18/2002 | Aroclor-1254 0.040 <0.040 <0.040 | Lead 475 127 41.7 J
504360 | Depth(Feet) (0 – 1) (1 – 2) | Date 12/9/1997 12/9/1997 | Aroclor-1254 0.56 10 D* | Lead 7,370 16,200
IAA-SS025
IAA-SS027
IAA-SS026 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 9,450 J [6,820 J]
502460
502436
502240
IAA-SS028
502
IAA-SS023 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 54.9 J
IAA-SS025 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 299 J
504336 | Depth(Feet) (0 – 1) (1 – 2) | Date 12/9/1997 12/9/1997 | Aroclor-1254 6.32 0.054 P | Lead 3,850 1,280
IAA-SS029
IAA-SS027 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 744 J
IAA-SS024
IAA-SS029 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 1,790 J
IAA-SS028 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 5,160 J
502460 | Depth(Feet) (0 – 1) (1 – 2) | Date 12/11/1997 12/11/1997 | Aroclor-1254 0.041 JP ND | Lead 40.3 43.2
IASD10
IAA-SS024 | Depth(Feet) (0 – 0.5) | Date 8/1/2008 | Lead 118 J
50240 | Depth(Feet) (0 – 1) (1 – 2) (2 – 3) | Date 12/8/1997 12/11/1997 12/11/1997 | Aroclor-1254 0.28 0.031 JP 0.0070 JP | Lead 25.9 28.0 26.7
502436 | Depth(Feet) (0 – 1) (1 – 2) | Date 12/11/1997 12/11/1997 | Aroclor-1254 0.14 0.13 | Lead 51.9 36.1
IAA-SS035 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 35.0 J
IAA-SS035
SS-03
IASB08
IASB07
IASB06
IAA-SS018
IATP2B/D
IATP2A/C
IASB05
IASB09
IAA-SS017
IAA-SS020 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 77.0 J
IAA-SS020
IASB06
IAA-SS019
IAA-SS021 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 155 J
IAA-SS022 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 360 J
IAA-SS022
IAA-SS021
IASD11
IAA-SS019 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 105 J
IAA-SS017 | Depth(Feet) (0 – 0.5) | Date 7/31/2008 | Lead 5,160 J
IASB4 | Depth(Feet) (0.5 – 1.5) (5 – 6) | Date 8/5/1998 8/5/1998 | Lead 46.5 [28.0] 23.8
IAA-SS017
IASB4
IAA-SS031
IAA-SS030
IASD09
IAA-SS018
IATP2B/D
IATP2A/C
IASB05
IASB09
IASB08
IASB07
IASB06
IAA-SS020
IAA-SS019
IAA-SS022
IAA-SS021
IASD11
IAA-SS017
IASB10
IAA-SS016
IASS02
IASS01
IAA-VLTW01
IAA-SS032
IAA-SS033
IAA-SS034
IATR05
IAA-SS030
IASD09
IATR07
IASD07
IATR06
IASB13
504312
504
IASB14
504360
504336
IASB15
IAA-SS026
IAA-SS025
IAA-SS027
IAA-SS023
IAA-SS024
IASD10
IAA-SS029
IAA-SS028
502460
502436
502240
502
IASD12
IAA-SS014
IASB11
IAA-SS015
IATR03
IAA-SS004
IAA-SE004
IAA-SE003
IAA-SS002
IAA-SS001
IAA-SB001
IASS05
IASS04
IAA-SS016
IASS02
IASS01
IAA-VLTW01
IAA-SS032
IAA-SS033
IAA-SS034
IATR05
IAA-SS030
IASD09
IATR07
IASD07
IATR06
IASB13
504312
504
IASB14
504360
504336
IASB15
IAA-SS026
IAA-SS025
IAA-SS027
IAA-SS023
IAA-SS024
IASD10
IAA-SS029
IAA-SS028
502460
502436
502240
502
IATR08
IATR08 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects
IAA-SS037 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 94.5 J
IAA-SS038 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 71.4 J [33.9 J]
IAA-SS039 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 111 J
IAA-SS036 | Depth(Feet) (0 – 0.5) | Date 8/5/2008 | Lead 101 J
IAA-SS037
IAA-SS038
IAA-SS039
IAA-SS036
569
565
562
561
570
571
8102-1
8102-2
8102-3
8102-4
8102-5
8102-6
8102-7
8102-8
4
3
5
6
1
2
521
522
522A
501
8101
IAA-SB001
IAA-SS001
IAA-SS002
IAA-SE003
IAA-SE004
IAA-SE001
IAA-SE002
IAA-SS004
IAA-SS005
IAA-SS003
IACF2
IACF1
IATP1B/D
IATR1A/C
IAA-SS006
IAA-SS008
IAA-SS007
IASB1
81022660
81022612
81022636
IASB12
IAA-SS005
IAA-SS004
IAA-SE-001
IAA-SE-002
IASD06
IAA-SS043
IAA-SS042
IAA-SS041
IAA-SS040
IASD04
IATR01
IASD05
IAA-SS037
IAA-SS038
IAA-SS039
IAA-SS036
IAA-SS035
SS-03
IASB08
IASB07
IASB06
IAA-SS018
IATP2B/D
IATP2A/C
IASB05
IASB09
IAA-SS017
IAA-SS020
IASB06
IAA-SS019
IAA-SS021
IAA-SS022
IASD11
IAA-SS031
IAA-SS030
IASD09
IAA-SS016
IASS02
IASS01
IAA-VLTW01
IAA-SS032
IAA-SS033
IAA-SS034
IATR05
IAA-SS029
IAA-SS028
IAA-SS027
IAA-SS023
IAA-SS024
IASD10
IAA-SS026
IAA-SS025
IAA-SS027
IASB13
504312
504
IASB14
504360
504336
IASB15
IAA-SS026
IAA-SS025
IAA-SS027
IAA-SS023
IAA-SS024
IASD10
IAA-SS029
IAA-SS028
502460
502436
502240
502
IATR08
IATR08 | Depth(Feet) (0 – 0.5) | Date 6/20/2002 | All Analytes No Detects

Legend

- Sample Location
  All Detects Below RSLs
- Monitoring Well
- Open Side of Building
- Surface Water
- Paved Roads
- Railway Spur
- Drainage Ditch
- SWMU Area
- 1903 Building Footprint and Identification
- No Conductive Flooring Present
- Conductive Flooring Present

Analytical Data Legend

- J Constituent concentration qualified as estimated
- K Estimated concentration bias high
- L Estimated concentration bias low
- B Constituent concentration quantified as estimated
- 3.4 Yellow shaded results indicate detection above Residential RSL
- 903 Green shaded results indicate detection above Industrial RSL
- **903** Bolded results indicate detection above Background (Inorganics only)
- Units for Soil and Sediment Samples reported in mg/kg (Miligrams per kilogram)
- Units for TCLP Samples reported in mg/L (Miligrams per Liter)

0 100 200
SCALE IN FEET

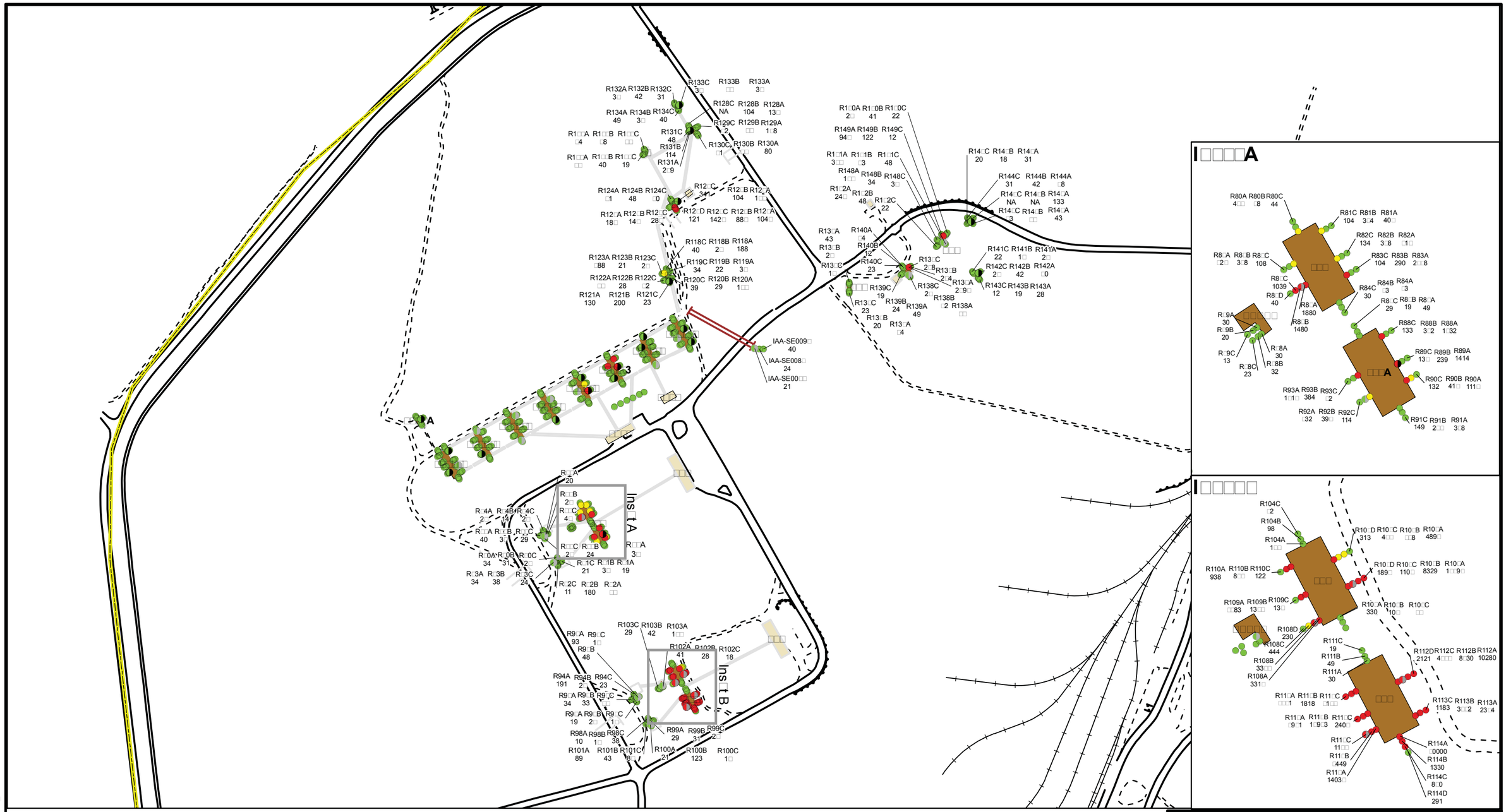
RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

COC DETECTIONS IN SOIL
IGNITER ASSEMBLY AREA

ARCADIS

FIGURE
2-6

CTB:---PLOTSTYLETABLE: ARCADIS NOVI.CTB PLOTTED: 10/1/2009 6:56 PM BY: ADMINISTRATOR
SAVED: 10/1/2009 4:36 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---
LAYOUT: DATA_COC_IAA_3-4_SED.SW
DWG: C:\Documents and Settings\Administrator\Desktop\Radford_SiteLayout_rev02.dwg
XREF: LAYERS:
DB: PIC: PM: TM: TR:
CITY:NOVI DIVISION:GROUP:ENV



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LE□END

□RF LEAD SCREENING RESULT

- □400 MG/□G
- 400 - □□0 MG/□G
- □□□0 MG/□G
- ASBESTOS PRESENT IN SAMPLE
- ASBESTOS NOT PRESENT IN SAMPLE

- PAVED ROADS
- DIRT ROADS
- SITE FEATURES
- RAIL SPUR
- SURFACE WATER
- CULVERT

- STUDY AREA
- INSTALLATION BOUNDARY

FORMER BUILDINGS

- NO CONDUCTIVE FLOORING
- YES CONDUCTIVE FLOORING

NOTES:
DISTANCE FROM BUILDINGS:
A: 1 FOOT (CLOSEST TO BUILDING)
B: □ FEET
C: 10 FEET
D: 1□ FEET (FARTHEST FROM BUILDING)

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

□□□ □IELD SC□EENIN□ □ES□LTS
I□NITE□ ASSE□ □L□ A□EA

ARCADIS

□I□□□E
□□□A

R154A 113 R154B 20 R154C 23
R153A 68 R153B 29 R153C 22
R155A 56
R15A 317 R15B 54 R15C 38
R14A 116 R14B 123 R14C 42
R13A 40 R13B 30 R13C 26
R12A 55 R12B 53 R12C 31
R5A 41 R5B 34 R5C 105
R4A 20 R4B 107 R4C 47
R3A 139 R3B 62 R3C 55
R2A 146 R2B 28 R2C 13
R1A 348 R1B 201 R1C 13
R11A 76 R11B 43 R11C 54
R10A 201 R10B 55 R10C 32
R9A 162 R9B 9 R9C 43
R8A 306 R8B 81 R8C 67
R7A 76 R7B 24 R7C 35
R6A 55 R6B 72 R6C 32
R23A 74 R23B 35 R23C 44
R22A 92 R22B 124 R22C 30
R21A 21 R21B 120 R21C 38
R20A 125 R20B 36 R20C 13
R28A 380 R28B 98 R28C 15
R29A 159 R29B 68 R29C 54
R30A 201 R30B 53 R30C 53
R31A 290 R31B 38 R31C 36
R19C 28 R19B 54 R19A 125
R18C 47 R18B 96 R18A 194
R17C 74 R17B 96 R17A 176
R16C 29 R16B 61 R16A 192
R36C 29 R36B 16 R36A 26
R37C 36 R37B 50 R37A 187
R38C 53 R38B 159 R38A 487
R39C 60 R39B 101 R39A 1185
R40C 98 R40B 87 R40A 152
R41C 57 R41B 55 R41A 85
R42C 59 R42B 123 R42A 299
R43C 80 R43B 88 R43A 58
R24C 58 R24B 45 R24A 150
R25C 45 R25B 169 R25A 114
R26C 33 R26B 70 R26A 85
R27C 68 R27B 79 R27A 54
R32C 59 R32B 48 R32A 338
R33C 10 R33B 38 R33A 164
R34C 35 R34B 132 R34A 154
R35C 58 R35B 101 R35A 201
R51A 970 R51B 57 R51C 40
R44A 71 R44B 94 R44C 18
R45A 1156 R45B 56 R45C 73
R46A 1340 R46B 248 R46C 12
R47A 134 R47B 54 R47C 41
R48C 43 R48B 90 R48A 123
R49C 45 R49B 62 R49A 286
R50C 54 R50B 27 R50A 109
IAA-SE001X 48
IAA-SE002X 35
IAA-SE003X 43
IAA-SE004X 39
IAA-SE005X 25
IAA-SE006X 21
R52A 201 R52B 157 R52C 24
R53A 102 R53B 56 R53C 54
R54A 167 R54B 167 R54C 25
R55A 37 R55B 14 R55C 18
R56C 21 R56B 32 R56A 109
R57C 53 R57B 73 R57A 59
R58C 33 R58B 79 R58A 277
R59C 56 R59B 93 R59A 194
R60C 22 R60B 25 R60A 268
R61C 45 R61B 25 R61A 52
R62C 41 R62B 38 R62A 55
R63C 62 R63B 91 R63A 58
R64C 35 R64B 36 R64A 105
R65C 16 R65B 42 R65A 291
R66C 49 R66B 119 R66A 269
R67C 34 R67B 75 R67A 135
R68C 31 R68B 57 R68A 31
R69C 32 R69B 53 R69A 19

Area Shown on Figure

LEGEND

XRF LEAD SCREENING RESULT

- <400 MG/KG
- 400 - 750 MG/KG
- >750 MG/KG
- ASBESTOS PRESENT IN SAMPLE
- ASBESTOS NOT PRESENT IN SAMPLE

- PAVED ROADS
- DIRT ROADS
- STUDY AREA
- INSTALLATION BOUNDARY

FORMER BUILDINGS

- NO CONDUCTIVE FLOORING
- YES CONDUCTIVE FLOORING

NOTES:
DISTANCE FROM BUILDINGS:
A: 1 FOOT (CLOSEST TO BUILDING)
B: 5 FEET
C: 10 FEET
D: 15 FEET (FARTHEST FROM BUILDING)

0 100 200 Feet
GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

XRF FIELD SCREENING RESULTS
IGNITER ASSEMBLY AREA

ARCADIS

FIGURE
2-7B

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LEGEND

- SITE FEATURES
- SURFACE WATER
- TRENCH
- PAVED ROADS
- DIRT ROADS
- RIPRAP
- STUDY AREA
- MAGAZINES
- INSTALLATION BOUNDARY

0 100 300 Feet

GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

BUILDING DEMOLITION DISPOSAL TRENCH SITE LAYOUT

ARCADIS

NYC: SER 4/AIT: DB: TBR LD: TBR PIC: TL
Radford (GP08RAAP.00PM)
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DTSB2	
Depth(Feet)	(2.5 – 3')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0022 U

DTSB9	
Depth(Feet)	(3 – 3.5')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.85

DTSB6	
Depth(Feet)	(1 – 1.5')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0020 U

DTSB11	
Depth(Feet)	(3.5 – 4')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.020 J

DTSB1	
Depth(Feet)	(0.5 – 1')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.030

DTSB13	
Depth(Feet)	(0.5 – 1')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.23

DTSB3	
Depth(Feet)	(2.5 – 3')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0021 U [0.0039]

DTSB7	
Depth(Feet)	(2 – 2.5')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0020

DTSB15	
Depth(Feet)	(2 – 2.5')
Date	8/13/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0071

DTSB4	
Depth(Feet)	(2.5 – 3')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0030

DTSB8	
Depth(Feet)	(1 – 1.5')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.83

DTSB17	
Depth(Feet)	(3 – 3.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	7.4 [28]

DTSB5	
Depth(Feet)	(0.5 – 1')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0020 U

DTSB10	
Depth(Feet)	(3.5 – 4')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.41

DTSB19	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0032

DTSB12	
Depth(Feet)	(3.5 – 4')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0021

DTSB21	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	1.7

DTSB14	
Depth(Feet)	(3.5 – 4')
Date	8/12/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.050

DTSB23	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0021 U

DTSB16	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	22

DTSB35	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	1.8 J

DTSB18	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	1.6

DTSB36	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0020 U

DTSB20	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.21

DTSB37	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0018 J

DTSB22	
Depth(Feet)	(2 – 2.5')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	2.1

DTSB38	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0021 J

DTSB48		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	7/13/2004	7/20/2004
PAHs		
Benzo(a)pyrene (mg/kg)	2.8 [2.6]	5.0

DTSB82	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0085 U

DTSB39	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.0024 J

BDDT-SB001		
Depth(Feet)	(2 – 3')	(3 – 4')
Date	7/28/2008	7/28/2008
SVOCs		
Benzo(a)pyrene (mg/kg)	0.070	0.0042 U

BDDT-SS001	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.34

DTSB40	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.15 J

DTSB52	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	2.0

DTSB41	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.010 J

DTSB84	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0086 U

DTSB56	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.97

DTSB42	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	1.7 J

DTSB57	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0088 U

DTSB43	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	1.9 J

BDDT-SS006	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0039 U

DTSB44	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	10 J [2.1 J]

DTSB60	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.011 U

DTSB45	
Depth(Feet)	(0.5 – 1')
Date	8/18/1998
PAHs	
Benzo(a)pyrene (mg/kg)	1.3 J

DTSB65	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.058

DTSB51	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	2.7

BDDT-SS007	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0044 U

DTSB81	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.093

DTSB86	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.025

DTSB89	
Depth(Feet)	(0 – 0.5')
Date	7/23/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.068

DTSB69	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.15

BDDT-SB002		
Depth(Feet)	(2 – 3')	(3 – 4')
Date	7/28/2008	7/28/2008
SVOCs		
Benzo(a)pyrene (mg/kg)	0.025	0.051

BDDT-SS008	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0041 U

BDDT-SS002	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.26

DTSB70	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.11 L

DTSB50	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.18

DTSB88	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.052

DTSB83	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.011

DTSB80	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.024 K

DTSW/SD08	
Depth(Feet)	(0 – 0.5')
Date	6/20/2002
PAHs	
Benzo(a)pyrene (mg/kg)	0.013

DTSW/SD06	
Depth(Feet)	(0 – 0.5')
Date	6/20/2002
PAHs	
Benzo(a)pyrene (mg/kg)	0.017

DTSW/SD05	
Depth(Feet)	(0 – 0.5')
Date	6/20/2002
PAHs	
Benzo(a)pyrene (mg/kg)	0.35

DTSD01		
Depth(Feet)	(0 – 0.5')	(0 – 0.5')
Date	7/17/1998	8/17/1998
PAHs		
Benzo(a)pyrene (mg/kg)	0.0031 U	0.030 J

DTSW/SD09	
Depth(Feet)	(0 – 0.5')
Date	6/20/2002
PAHs	
Benzo(a)pyrene (mg/kg)	0.014

DTSB55		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	7/13/2004	7/20/2004
PAHs		
Benzo(a)pyrene (mg/kg)	32	0.12

BDDT-SE003	
Depth(Feet)	(0 – 0.5')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0048 U

DTSB54	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0091 U

BDDT-SE004	
Depth(Feet)	(0 – 0.5')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.13

BDDT-SS003	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0045 U

DTSW/SD10	
Depth(Feet)	(0 – 0.5')
Date	6/20/2002
PAHs	
Benzo(a)pyrene (mg/kg)	0.71

DTSB85	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0088 U

DTSD04	
Depth(Feet)	(0 – 0.5')
Date	8/17/1998
PAHs	
Benzo(a)pyrene (mg/kg)	0.020 J

DTSB59		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	7/13/2004	7/20/2004
PAHs		
Benzo(a)pyrene (mg/kg)	2.2 [3.2]	0.0083 U

DTSB58	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.27 L

DTSD02		
Depth(Feet)	(0 – 0.5')	(0 – 0.5')
Date	7/17/1998	8/17/1998
PAHs		
Benzo(a)pyrene (mg/kg)	0.0026 U	0.040 U

BDDT-SS004	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0042 U

BDDT-SS005	
Depth(Feet)	(0 – 1')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0040 U [0.0040 U]

BDDT-SE002	
Depth(Feet)	(0 – 0.5')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0045 U

DTSB62	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0091 U

DTSB78	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.079

DTSB46		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	6/12/2002	6/12/2002
PAHs		
Benzo(a)pyrene (mg/kg)	57	0.021

DTSB47		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	6/12/2002	6/12/2002
PAHs		
Benzo(a)pyrene (mg/kg)	6.5 [0.10]	0.013

DTSB63	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.28 J

DTSB77		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	7/13/2004	7/20/2004
PAHs		
Benzo(a)pyrene (mg/kg)	6.3	0.0080 U

DTSS3	
Depth(Feet)	(0 – 0.5')
Date	8/11/1998
SVOCs	
Benzo(a)pyrene (mg/kg)	0.31 J

DTSB71	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.19 [0.20]

DTSW/SD07	
Depth(Feet)	(0 – 0.5')
Date	6/20/2002
PAHs	
Benzo(a)pyrene (mg/kg)	0.013 [0.012]

DTSB76	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.39 J

BDDT-SE001	
Depth(Feet)	(0 – 0.5')
Date	7/28/2008
SVOCs	
Benzo(a)pyrene (mg/kg)	0.0044 UJ

DTSB67		
Depth(Feet)	(0 – 0.5')	(1 – 3')
Date	7/13/2004	7/20/2004
PAHs		
Benzo(a)pyrene (mg/kg)	22	0.0081 U

DTSS1	
Depth(Feet)	(0 – 0.5')
Date	8/11/1998
SVOCs	
Benzo(a)pyrene (mg/kg)	2.1

DTSB68	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.60

DTSB66	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0084 U

DTSS2	
Depth(Feet)	(0 – 0.5')
Date	8/11/1998
SVOCs	
Benzo(a)pyrene (mg/kg)	2.0

DTSB74	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.0089

DTSB75	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.42 J [1.1 J]

DTSB64	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.88

DTSB03		
Depth(Feet)	(0 – 0.5')	(0 – 0.5')
Date	7/17/1998	8/17/1998
PAHs		
Benzo(a)pyrene (mg/kg)	0.0028 U	0.040 UJ

DTSB87	
Depth(Feet)	(0 – 0.5')
Date	7/20/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.010

DTSB73	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.034

DTSB72	
Depth(Feet)	(0 – 0.5')
Date	7/13/2004
PAHs	
Benzo(a)pyrene (mg/kg)	0.067

DTSW/SD09
DTSW/SD08
DTSW/SD07
DTSW/SD06
DTSW/SD05
DTSW/SD10
DTSD04
DTSW4
BDDT-SW001
BDDT-SE001
BDDT-SW002
BDDT-SE002
BDDT-SW003
BDDT-SE003
BDDT-SW004
BDDT-SE004
SD-06
DTSW1
DTSD01
SD-08
DTSW2
DTSD02

Legend

- Sample Location All Detects Below RSLs
- Sample Location Above Industrial Criteria and Background (Inorganics only)
- Sample Location Above Residential Criteria and Background (Inorganics only)
- Building Debris Disposal Trench
- Surface Water
- Paved Roads
- Drainage Ditch
- Riprap/Geotextile
- SWMU Area
- Building Footprint and Identification

Analytical Data Legend

- J — Constituent concentration qualified as estimated
- K — Estimated concentration bias high
- L — Estimated concentration bias low
- B — Constituent concentration quantified as estimated
- 3.4 — Yellow shaded results indicate detection above Residential RSL
- 903 — Green shaded results indicate detection above Industrial RSL
- **903** — Bolded results indicate detection above Background (Inorganics only)
- Units for Soil and Sediment Samples reported in mg/kg (Miligrams per kilogram)
- Units for TCLP Samples reported in mg/L (Miligrams per Liter)

0 80 160

SCALE IN FEET

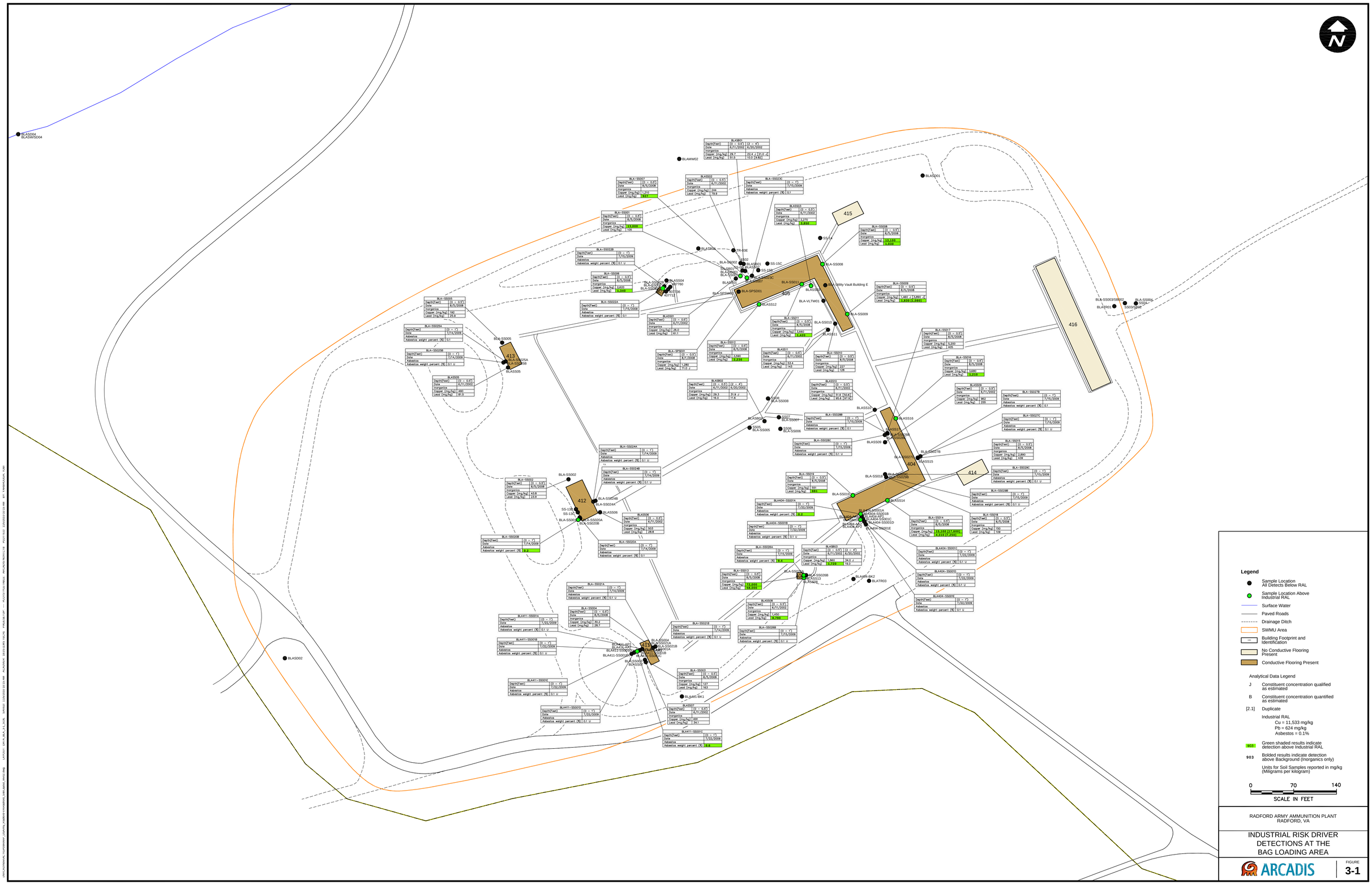
RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

COC DETECTIONS IN SOIL AND SEDIMENT BUILDING DEBRIS DISPOSAL TRENCH

ARCADIS

FIGURE
2-9

PLOTTED: 9/22/2010 2:22 PM BY: YARBROUGH, TOBI
LAYOUT: DATA_BDDT_3-13_COC_SEDSOIL SAVED: 9/2/2010 1:46 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---PLOTSTYLETABLE: ARCADIS NOVI.CTB
PROJECT NUMBER:
G:\ENVCAD\NAVFAC\FGP08RAAP_USArmy_Radford-VA\RadBrd_SiteLayout_rev02.dwg


BLASD04
BLASWSD04
BLAMW02
BLASD01
BLASS01
Depth(Feet) (0 – 0.5') (2 – 4')
Date 6/11/2002 6/20/2002
Inorganics
Copper (mg/kg) 29.7 22.4 J [15.0 J]
Lead (mg/kg) 51.5 10.0 [9.82]
BLASS02
Depth(Feet) (0 – 0.5')
Date 6/11/2002
Inorganics
Copper (mg/kg) 244
Lead (mg/kg) 79.9
BLASS03
Depth(Feet) (0 – 0.5')
Date 6/11/2002
Inorganics
Copper (mg/kg) 2,210
Lead (mg/kg) 2,830
BLA-SS023C
Depth(Feet) (0 – 1')
Date 7/15/2009
Asbestos
Asbestos weight percent (%) 0.1
BLA-SS027
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 1,270
Lead (mg/kg) 937
BLA-SS001
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 12,600
Lead (mg/kg) 1,100
BLA-SS008
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 13,100
Lead (mg/kg) 1,630
BLA-SS022B
Depth(Feet) (0 – 1')
Date 7/15/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA-SS006
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 2,620
Lead (mg/kg) 2,220
BLA-SS005
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 192
Lead (mg/kg) 25.9
BLA-SS022A
Depth(Feet) (0 – 1')
Date 7/15/2009
Asbestos
Asbestos weight percent (%) 0.1
BLA-SS009
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 1,420 / 13,890 J
Lead (mg/kg) 1,370 / 13,600
BLA-SS025A
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.1
BLA-SS025B
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLASS01
Depth(Feet) (0 – 0.5')
Date 6/11/2002
Inorganics
Copper (mg/kg) 26.0
Lead (mg/kg) 61.1
BLA-SS011
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 3,440
Lead (mg/kg) 1,410
BLA-SS017
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 5,300
Lead (mg/kg) 405
BLA-SS025C
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA-SS023
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 3,590
Lead (mg/kg) 2,310
BLA-SP001
Depth(Feet) (0 – 0.5')
Date 6/11/2002
Inorganics
Copper (mg/kg) 1,280
Lead (mg/kg) 710 J
BLASS11
Depth(Feet) (0 – 0.5')
Date 6/11/2002
Inorganics
Copper (mg/kg) 53.4
Lead (mg/kg) 143
BLA-SS010
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 727
Lead (mg/kg) 139
BLA-SS016
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 3,680
Lead (mg/kg) 1,210
BLA-SS024A
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA-SS024B
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLASB02
Depth(Feet) (0 – 0.5') (2 – 4')
Date 6/11/2002 6/20/2002
Inorganics
Copper (mg/kg) 29.3 51.9 J
Lead (mg/kg) 16.0 11.6
BLASS10
BLASS08
BLASS16
BLASS12
BLASS13
BLASS14
BLASS15
BLA-SS002
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 43.9
Lead (mg/kg) 33.9
BLA-SS002B
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.3
BLA-SS006
Depth(Feet) (0 – 0.5')
Date 6/11/2002
Inorganics
Copper (mg/kg) 503
Lead (mg/kg) 28.8
BLA-SS002A
Depth(Feet) (0 – 1')
Date 7/14/2009
Asbestos
Asbestos weight percent (%) 0.1
BLA-SS019
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 551
Lead (mg/kg) 661
BLA-SS012
BLA-SS028B
BLA-SS028C
BLA-SS028D
BLA-SS027B
BLA-SS027C
BLA-SS027D
BLA-SS029B
BLA-SS029C
BLA-SS029D
BLA-SS015
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 2,890
Lead (mg/kg) 439
BLA-SS018
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 150
Lead (mg/kg) 109
BLA404-SS001A
Depth(Feet) (0 – 1')
Date 7/22/2009
Asbestos
Asbestos weight percent (%) 0.2
BLA404-SS001B
Depth(Feet) (0 – 1')
Date 7/22/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA404-SS001A
BLA404-SS001B
BLA404-SS001C
BLA404-SS001D
BLA404-SS001E
BLA-SS024
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 15,100 / 4,310 [7,310]
Lead (mg/kg) 1,630 / 1,210 [1,240]
BLA404-SS001C
Depth(Feet) (0 – 1')
Date 7/22/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA404-SS001D
Depth(Feet) (0 – 1')
Date 7/22/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA404-SS001E
Depth(Feet) (0 – 1')
Date 7/22/2009
Asbestos
Asbestos weight percent (%) 0.1 U
BLA-SS028A
Depth(Feet) (0 – 1')
Date 7/15/2009
Asbestos
Asbestos weight percent (%) 4.4
BLASB03
Depth(Feet) (0 – 0.5') (2 – 4')
Date 6/11/2002 6/20/2002
Inorganics
Copper (mg/kg) 1,960 34.0 J
Lead (mg/kg) 1,970 18.0
BLA-SS013
Depth(Feet) (0 – 0.5')
Date 8/5/2008
Inorganics
Copper (mg/kg) 12,600
Lead (mg/kg) 16,000
BLA-SS026B
BLA-SS026C
BLA-SS026D
BLA-SS026E
BLA-SS026F
BLA-SS026G
BLA-SS026H
BLA-SS026I
BLA-SS026J
BLA-SS026K
BLA-SS026L
BLA-SS026M
BLA-SS026N
BLA-SS026O
BLA-SS026P
BLA-SS026Q
BLA-SS026R
BLA-SS026S
BLA-SS026T
BLA-SS026U
BLA-SS026V
BLA-SS026W
BLA-SS026X
BLA-SS026Y
BLA-SS026Z
BLA-SS026AA
BLA-SS026AB
BLA-SS026AC
BLA-SS026AD
BLA-SS026AE
BLA-SS026AF
BLA-SS026AG
BLA-SS026AH
BLA-SS026AI
BLA-SS026AJ
BLA-SS026AK
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BLA-SS026BR
BLA-SS026BS
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BLA-SS026BV
BLA-SS026BW
BLA-SS026BX
BLA-SS026BY
BLA-SS026BZ
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BLA-SS026CB
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BLA-SS026CD
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BLA-SS026CF
BLA-SS026CG
BLA-SS026CH
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BLA-SS026CJ
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BLA-SS026CN
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BLA-SS026CQ
BLA-SS026CR
BLA-SS026CS
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BLA-SS026DV
BLA-SS026DW
BLA-SS026DX
BLA-SS026DY
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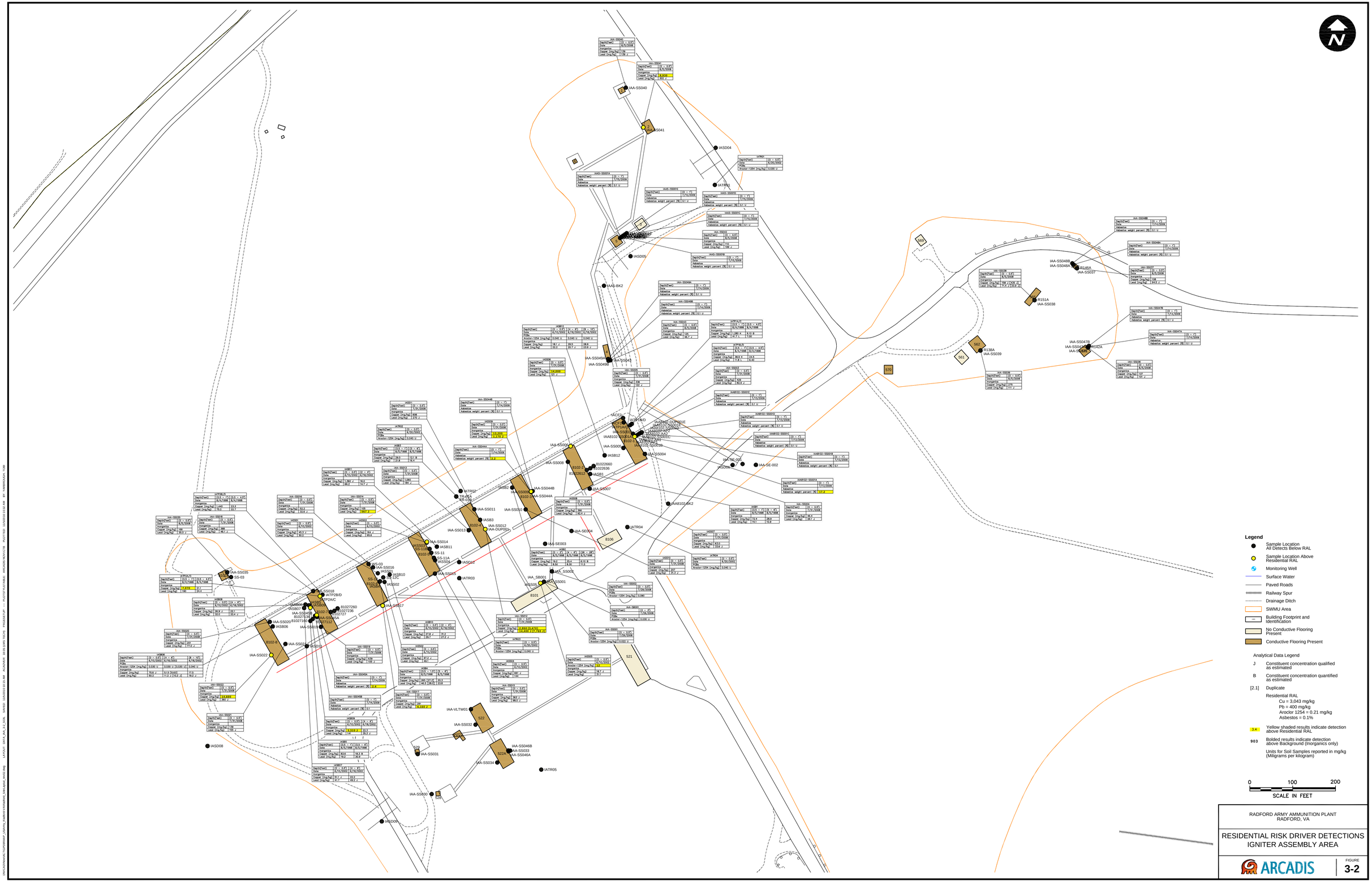
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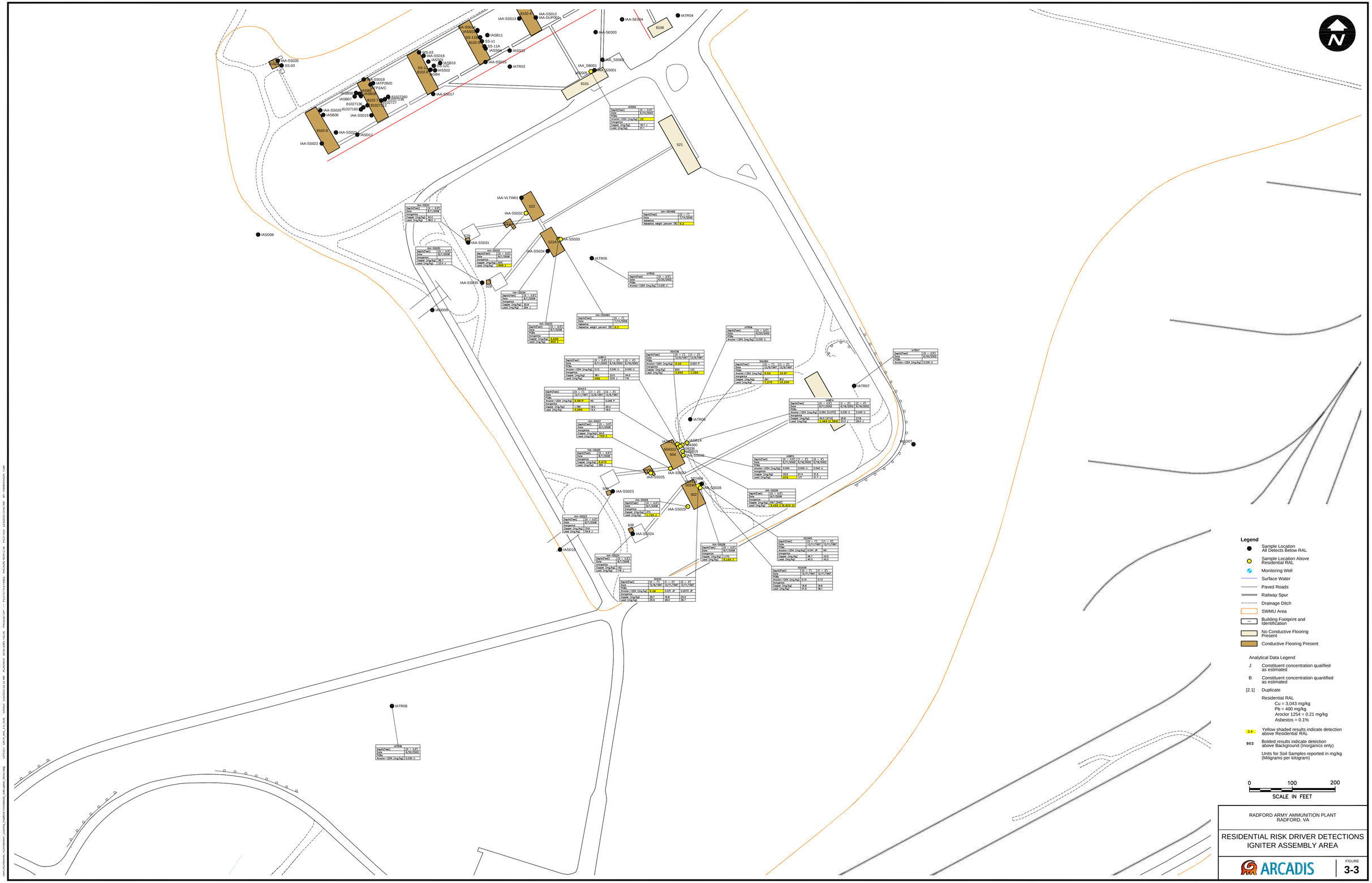
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S22A
S20
S29
S28
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S06
S04
S04A
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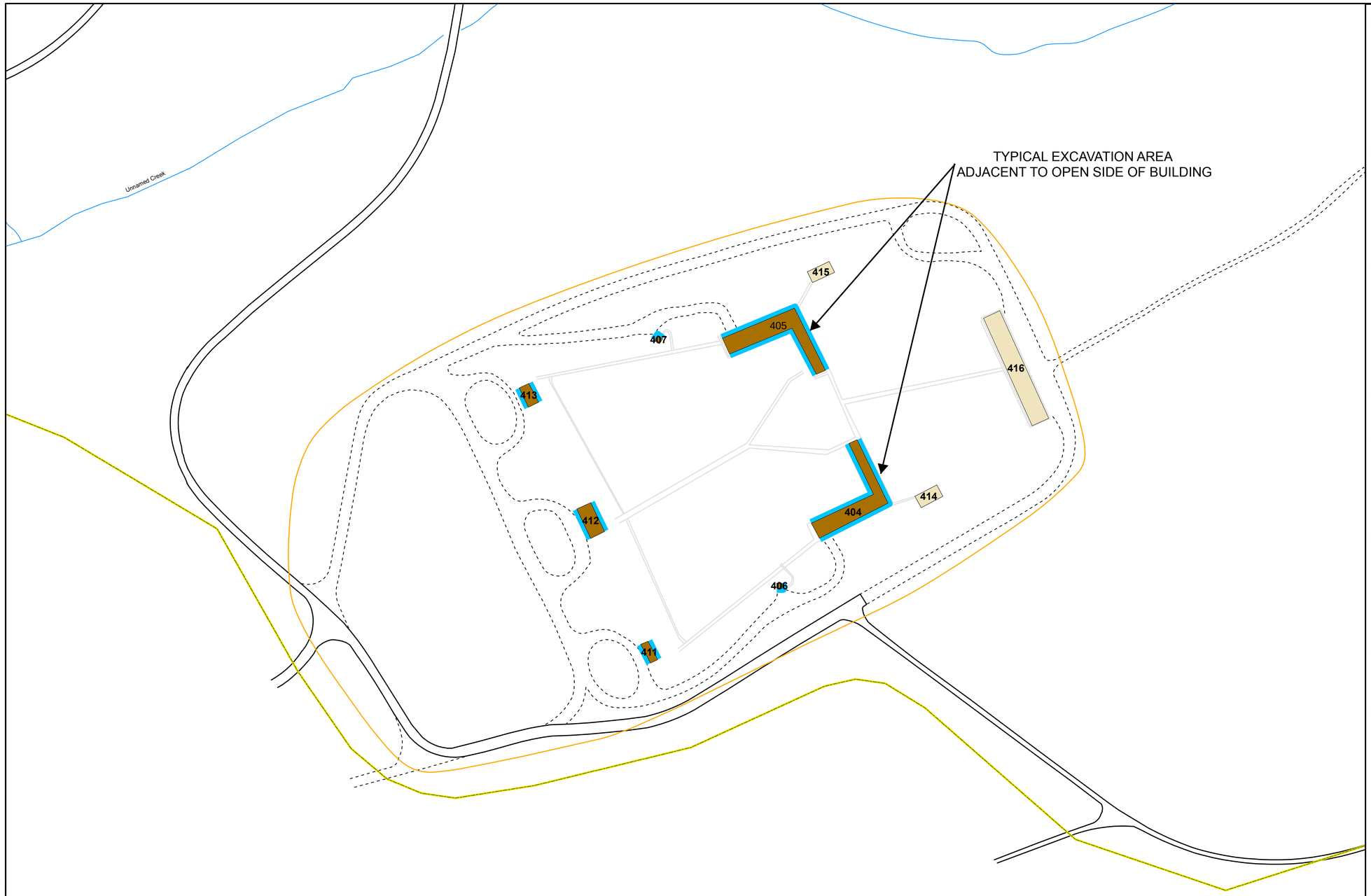
8102-U
8102-V
8102-W
8102-X
8102-Y
8102-Z
8101
8106
IAA-SS005
Depth(Feet) (0 – 0.5')
Date 8/15/2002
PCBs
Aroclor-1254 (mg/kg) 3.4
Inorganics
Copper (mg/kg) 18.7 J
Lead (mg/kg) 31 J
IAA-SS027
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 42.4
Lead (mg/kg) 38.0 J
IAA-SS035
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 56.7
Lead (mg/kg) 153.4 J
IAA-SS032
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 610
Lead (mg/kg) 1,010 J
IAA-SS034
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 31.8
Lead (mg/kg) 284 J
IAA-SS033
Depth(Feet) (0 – 0.5')
Date 8/7/2008
PCBs
Inorganics
Copper (mg/kg) 5,430
Lead (mg/kg) 910 J
IAA-SS048A
Depth(Feet) (0 – ?')
Date 7/1/2008
Asbestos
Asbestos weight percent (%) 0.2
IAA-SS048B
Depth(Feet) (0 – ?')
Date 7/1/2008
Asbestos
Asbestos weight percent (%) 0.2
IATR05
Depth(Feet) (0 – 0.5')
Date 8/31/2005
PCBs
Aroclor-1254 (mg/kg) 0.030 U
IAA-SS037
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 1,570
Lead (mg/kg) 6,110 J
IASB13
Depth(Feet) (0 – 0.5') (1 – 2') (2 – 4')
Date 8/7/2008 8/18/2003 8/18/2003
PCBs
Aroclor-1254 (mg/kg) 0.73 0.040 U 0.045 U
Inorganics
Copper (mg/kg) 36.1 33.0 34.0
Lead (mg/kg) 159 215 J 78
SS4312
Depth(Feet) (1 – 2') (2 – 3') (3 – 4')
Date 12/21/1987 12/8/1987 12/8/1987
PCBs
Aroclor-1254 (mg/kg) 0.89 P ND 0.048 P
Inorganics
Copper (mg/kg) 1,780 19.0 30.4
Lead (mg/kg) 6,200 15.4 19.5
IAA-SS027
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 49.6
Lead (mg/kg) 144 J
IAA-SS025
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 4,470
Lead (mg/kg) 599 J
IAA-SS023
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 874
Lead (mg/kg) 1,730 J
IAA-SS031
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 15.4
Lead (mg/kg) 34.9 J
IAA-SS029
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 152
Lead (mg/kg) 118 J
IAA-SS024
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 1,570
Lead (mg/kg) 6,110 J
IAA-SS028
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 697 [410]
Lead (mg/kg) 5,430 J [4,320 J]
IAA-SS008
Depth(Feet) (0 – 0.5')
Date 8/7/2008
Inorganics
Copper (mg/kg) 1,570
Lead (mg/kg) 6,110 J
SS06
Depth(Feet) (0 – 1') (1 – 2') (2 – 3')
Date 12/8/1987 12/21/1987 12/21/1987
PCBs
Aroclor-1254 (mg/kg) 0.29 0.031 JP 0.0070 JP
Inorganics
Copper (mg/kg) 29.7 16.8 22.4
Lead (mg/kg) 25.6 19.5 26.7
SS4310
Depth(Feet) (0 – 1') (1 – 2') (2 – 3')
Date 12/8/1987 12/21/1987 12/21/1987
PCBs
Aroclor-1254 (mg/kg) 0.34 0.14 0.13
Inorganics
Copper (mg/kg) 19.0 19.8 18.8
Lead (mg/kg) 15.9 36.1
SS4312
Depth(Feet) (0 – 1') (1 – 2') (2 – 3')
Date 12/21/1987 12/21/1987
PCBs
Aroclor-1254 (mg/kg) 0.14 0.13
Inorganics
Copper (mg/kg) 19.0 19.8
Lead (mg/kg) 15.9 36.1
SS4340
Depth(Feet) (0 – 1') (1 – 2')
Date 12/21/1987 12/21/1987
PCBs
Aroclor-1254 (mg/kg) 0.041 JP ND
Inorganics
Copper (mg/kg) 38.7 33.5
Lead (mg/kg) 49.3 43.5
SS4360
Depth(Feet) (0 – 1') (1 – 2')
Date 12/8/1987 12/8/1987
PCBs
Aroclor-1254 (mg/kg) 0.56 0.0^
Inorganics
Copper (mg/kg) 397 812
Lead (mg/kg) 7,770 17,200
IATR07
Depth(Feet) (0 – 0.5')
Date 8/29/2002
PCBs
Aroclor-1254 (mg/kg) 0.030 U
IASB14
Depth(Feet) (0 – 0.5') (1 – 2') (2 – 4')
Date 8/7/2002 8/18/2003 8/18/2003
PCBs
Aroclor-1254 (mg/kg) 0.060 [0.070] 0.030 U 0.040 U
Inorganics
Copper (mg/kg) 403 [414] 25.6 17.8
Lead (mg/kg) 1,480 [1,980] 24.2 J 29.0 J
IASB15
Depth(Feet) (0 – 0.5') (1 – 2') (2 – 4')
Date 8/7/2002 8/18/2002 8/18/2002
PCBs
Aroclor-1254 (mg/kg) 0.040 0.040 U 0.040 U
Inorganics
Copper (mg/kg) 32.6 61.4 21.3
Lead (mg/kg) 416 197 41.7 J
IATR08
Depth(Feet) (0 – 0.5')
Date 8/30/2002
PCBs
Aroclor-1254 (mg/kg) 0.030 U
Legend
Sample Location
All Detects Below RAL
Sample Location Above
Residential RAL
Monitoring Well
Surface Water
Paved Roads
Railway Spur
Drainage Ditch
SWMU Area
Building Footprint and
Identification
No Conductive Flooring
Present
Conductive Flooring Present
Analytical Data Legend
J Constituent concentration qualified as estimated
B Constituent concentration quantified as estimated
[2.1] Duplicate
Residential RAL
Cu = 3,043 mg/kg
Pb = 400 mg/kg
Aroclor 1254 = 0.21 mg/kg
AsBestos = 0.1%
3.4 Yellow shaded results indicate detection above Residential RAL
903 Bolded results indicate detection above Background (Inorganics only)
Units for Soil Samples reported in mg/kg (Milligrams per kilogram)
0
100
200
SCALE IN FEET
RADFORD ARMY AMMUNITION PLANT
RADFORD, VA
RESIDENTIAL RISK DRIVER DETECTIONS
IGNITER ASSEMBLY AREA
ARCADIS
FIGURE
3-3



NOTES:

1. EROSION AND SEDIMENT CONTROLS ARE TO BE PLACED DOWN GRADIENT OF DISTURBANCE AREAS, AS DETERMINED BY THE ENGINEER. ALL EROSION AND SEDIMENT CONTROLS ARE TO REMAIN IN PLACE UNTIL THE SITE IS STABILIZED WITH VEGETATION AND APPROVED FOR REMOVAL BY THE ENGINEER.

2. STABILIZED CONSTRUCTION ENTRANCES AND TEMPORARY ACCESS ROADS SHALL BE CONSTRUCTED AS DEPICTED ON CONSTRUCTION DRAWING #3. THE LOCATION OF STABILIZED CONSTRUCTION ENTRANCES AND TEMPORARY ACCESS ROADS SHALL BE FIELD DETERMINED BY THE ENGINEER.

3. THE CLEARING OF VEGETATION FOR SITE ACCESS SHALL BE KEPT TO A MINIMUM. ABOVE GROUND PORTIONS OF THE CLEARED VEGETATION SHALL BE CHIPPED AND DISPOSED OF ON-SITE. PORTIONS OF THE VEGETATION THAT ARE BELOW GROUND AND WITHIN THE EXCAVATION AREA SHALL BE HANDLED AND DISPOSED OF AS ASBESTOS CONTAINING MATERIAL.

4. REMOVAL OF CONDUCTIVE FLOORING WILL OCCUR AT THE BUILDINGS AS INDICATED BY THIS FIGURE.

5. EXCAVATION OF SOIL WILL PRIMARILY OCCUR ON THE OPEN SIDES OF THE BUILDINGS WHERE THERE ARE PATHWAYS FOR THE CONDUCTIVE FLOORING TO HAVE WASHED OFF OF THE BUILDING PADS ONTO THE ADJACENT SOIL AS DEPICTED IN THIS DRAWING, OR AS DETERMINED BY THE ENGINEER.

6. THE INITIAL EXCAVATION EXTENT WILL EXTEND HORIZONTALLY 2 FEET FROM THE BASE OF AFFECTED BUILDINGS, AND PROCEED VERTICALLY TO A DEPTH OF 1 FOOT. HOWEVER, THE FINAL EXCAVATION EXTENT WILL BE FIELD DETERMINED BY THE ENGINEER BASED UPON FIELD ANALYSIS, LABORATORY ANALYSIS, AND VISUAL CONFIRMATION.

7. ALL EXCAVATED SOIL AND CONDUCTIVE FLOORING SHALL BE DISPOSED OF AT THE PERMITTED LANDFILL PRE-APPROVED BY THE ENGINEER.

8. UPON RECEIPT OF CONFIRMATION SAMPLING RESULTS INDICATING THAT THE FINAL EXCAVATION EXTENT HAS BEEN ACHIEVED, THE EXCAVATION AREAS SHALL BE BACKFILLED AND GRADED TO MATCH THE EXISTING GRADE.

Remedial Action Levels for Soil at the BLA	
Driver	**PRG**
Copper	11,533 mg/kg
Lead	624 mg/kg
Asbestos	0.1% by weight

LEGEND

- OPEN SIDE OF BUILDING, ADJACENT SOILS TO BE EXCAVATED
- PAVED ROADS
- DIRT ROADS
- SITE FEATURES
- SURFACE WATER
- FORMER RAISED WALKWAY PLATFORMS
- STUDY AREA
- INSTALLATION BOUNDARY

FORMER BUILDINGS
- NO CONDUCTIVE FLOORING
- YES CONDUCTIVE FLOORING

NOTE:
BUILDINGS 404 AND 405 ARE TWO STORY BUILDINGS

N

0 200 400 Feet

GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

BAG LOADING AREA

ARCADIS

DRAWING
1

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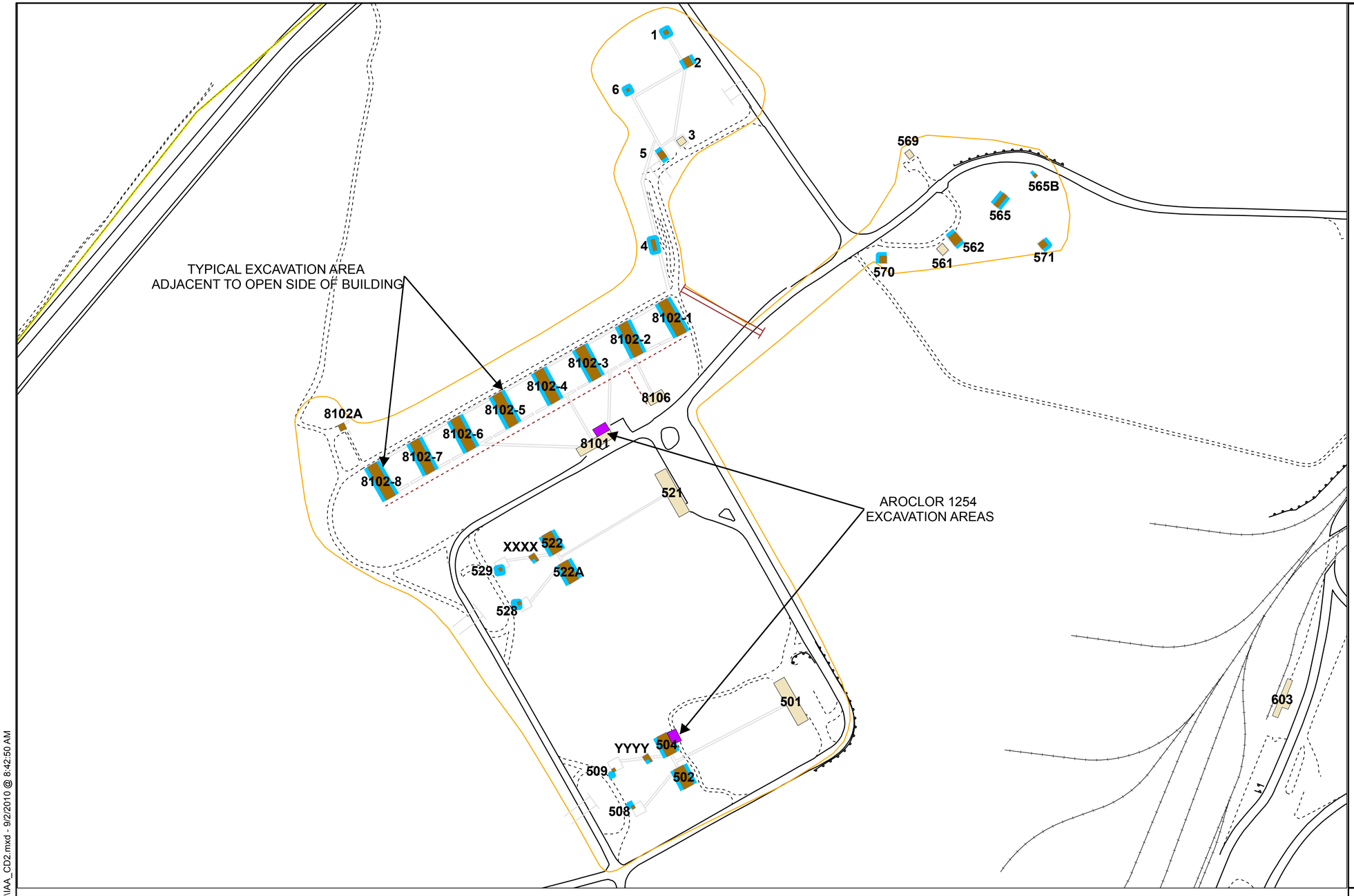

NOTES:

1. EROSION AND SEDIMENT CONTROLS ARE TO BE PLACED DOWN GRADIENT OF DISTURBANCE AREAS, AS DETERMINED BY THE ENGINEER. ALL EROSION AND SEDIMENT CONTROLS ARE TO REMAIN IN PLACE UNTIL THE SITE IS STABILIZED WITH VEGETATION AND APPROVED FOR REMOVAL BY THE ENGINEER

2. STABILIZED CONSTRUCTION ENTRANCES AND TEMPORARY ACCESS ROADS SHALL BE CONSTRUCTED AS DEPICTED ON CONSTRUCTION DRAWING #3. THE LOCATION OF STABILIZED CONSTRUCTION ENTRANCES AND TEMPORARY ACCESS ROADS SHALL BE FIELD DETERMINED BY THE ENGINEER.

3. THE CLEARING OF VEGETATION FOR SITE ACCESS SHALL BE KEPT TO A MINIMUM. ABOVE GROUND PORTIONS OF THE CLEARED VEGETATION SHALL BE CHIPPED AND DISPOSED OF ON-SITE. PORTIONS OF THE VEGETATION THAT ARE BELOW GROUND AND WITHIN THE EXCAVATION AREA SHALL BE HANDLED AND DISPOSED OF AS ASBESTOS CONTAINING MATERIAL.

4. REMOVAL OF CONDUCTIVE FLOORING WILL OCCUR AT THE BUILDINGS AS INDICATED BY THIS FIGURE.

5. EXCAVATION OF SOIL WILL PRIMARILY OCCUR ON THE OPEN SIDES OF THE BUILDINGS WHERE THERE ARE PATHWAYS FOR THE CONDUCTIVE FLOORING TO HAVE WASHED OFF OF THE BUILDING PADS ONTO THE ADJACENT SOIL AS DEPICTED IN THIS DRAWING, OR AS DETERMINED BY THE ENGINEER.

6. SOILS THAT EXCEED THE REMEDIAL ACTION LEVEL FOR AROCLOR 1254 WILL REQUIRE EXCAVATION, AS INDICATED ON THIS DRAWING. THE EXCAVATION AREAS FOR AROCLOR 1254 ARE NOT TO SCALE AS DEPICTED ON THIS DRAWING FOR ILLUSTRATION PURPOSES. THE ACTUAL EXCAVATION EXTENT FOR AROCLOR 1254 WILL BE FIELD DETERMINED BY THE ENGINEER.

7. THE INITIAL EXCAVATION EXTENT WILL EXTEND HORIZONTALLY 2 FEET FROM THE BASE OF AFFECTED BUILDINGS, AND PROCEED VERTICALLY TO A DEPTH OF 1 FOOT. HOWEVER, THE FINAL EXCAVATION EXTENT WILL BE FIELD DETERMINED BY THE ENGINEER BASED UPON FIELD ANALYSIS, LABORATORY ANALYSIS, AND VISUAL CONFIRMATION.

8. ALL EXCAVATED SOIL AND CONDUCTIVE FLOORING SHALL BE DISPOSED OF AT THE PERMITTED LANDFILL PRE-APPROVED BY THE ENGINEER.

9. UPON RECEIPT OF CONFIRMATION SAMPLING RESULTS INDICATING THAT THE FINAL EXCAVATION EXTENT HAS BEEN ACHIEVED, THE EXCAVATION AREAS SHALL BE BACKFILLED AND GRADED TO MATCH THE EXISTING GRADE.

Remedial Action Levels for Soil at the IAA	
Driver	**PRG**
Copper	3,043 mg/kg
Lead	400 mg/kg
Aroclor 1254	0.21 mg/kg
Asbestos	0.1% by weight

LEGEND

- AROCLOR 1254 EXCAVATION AREAS
- OPEN SIDE OF BUILDING, ADJACENT SOILS TO BE EXCAVATED
- PAVED ROADS
- DIRT ROADS
- SITE FEATURES
- RAIL SPUR
- SURFACE WATER
- CULVERT
- STUDY AREA
- INSTALLATION BOUNDARY
- FORMER BUILDINGS
  - NO CONDUCTIVE FLOORING
  - YES CONDUCTIVE FLOORING

N

0 300 600 Feet

GRAPHIC SCALE

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

IGNITER ASSEMBLY AREA

ARCADIS

DRAWING 2

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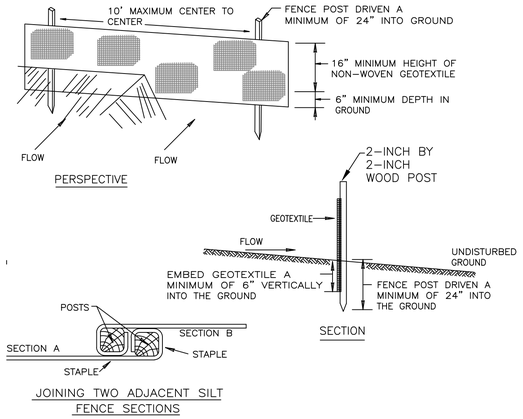


GEOTEXTILE:

PHYSICAL PROPERTIES	MINIMUM REQUIREMENT
FILTERING EFFICIENCY	85%
TENSILE STRENGTH AT 20% (MAX) ELONGATION:	
STANDARD STRENGTH	30 LBS./LINEAR IN.
EXTRA STRENGTH	50 LBS./LINEAR IN.

CONSTRUCTION SPECIFICATIONS:

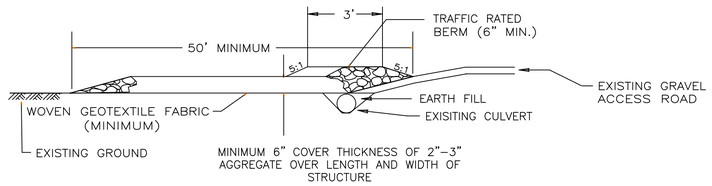
1. EXCAVATE A TRENCH AT LEAST 6 INCHES DEEP ALONG THE SILT FENCE ALIGNMENT.
2. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS AT A MAXIMUM OF 10 FEET.
3. FASTEN SUPPORT FENCE TO UPSLOPE SIDE OF POSTS, EXTENDING 6 INCHES INTO THE TRENCH.
4. ATTACH A CONTINUOUS LENGTH OF FABRIC TO THE UPSLOPE SIDE OF THE FENCE POSTS, MINIMIZING THE NUMBER OF JOINTS. AVOID JOINTS AT LOW POINTS IN THE FENCE LINE. WHERE JOINTS ARE NECESSARY, FASTEN FABRIC SECURELY TO SUPPORT POSTS AND OVERLAP TO THE NEXT POST.
5. PLACE THE BOTTOM 1-FOOT OF FABRIC IN THE 6-INCH DEEP TRENCH (MINIMUM), LAPPING TOWARD THE UPSLOPE SIDE. BACKFILL WITH COMPACTED EARTH OR GRAVEL.
6. IF USING A PRE-PACKED COMMERCIAL SILT FENCE RATHER THAN ON-SITE CONSTRUCTION; FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.

MAINTENANCE REQUIREMENTS

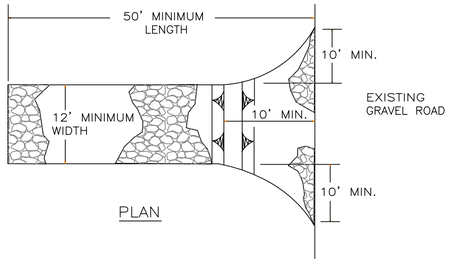
1. SILT FENCE SHALL BE INSPECTED AFTER EACH RAINFALL EVENT AND MAINTAINED WHEN "BULGES" OCCUR OR WHEN SEDIMENT ACCUMULATION REACHES 50% OF THE FABRIC HEIGHT. IF FENCE FABRIC TEARS, STARTS TO DECOMPOSE, OR IN ANY WAY BECOMES INEFFECTIVE, THE AFFECTED SECTION SHALL BE REPLACED IMMEDIATELY.

TYPICAL SILT FENCE DETAIL

N.T.S.



PROFILE



PLAN

CONSTRUCTION SPECIFICATIONS:

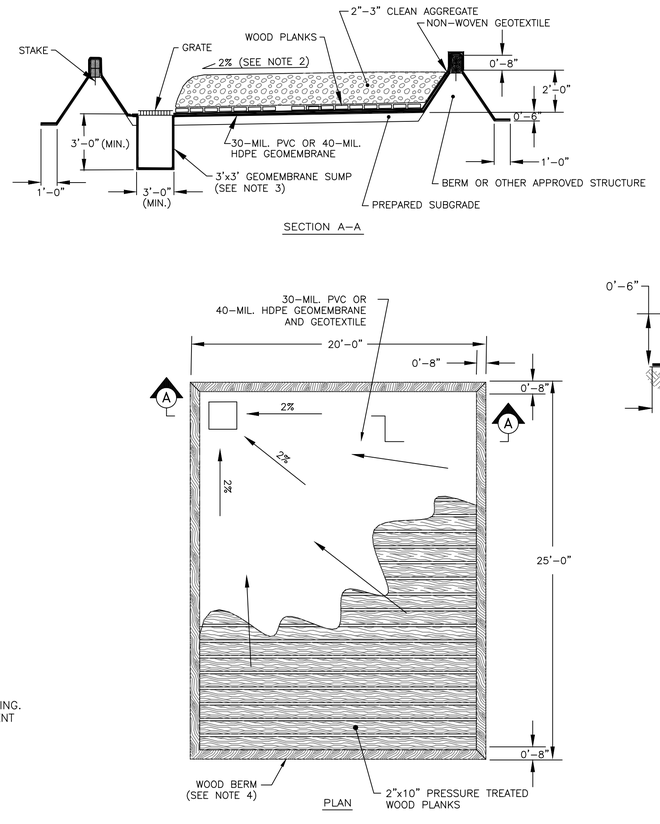
1. LENGTH: – MINIMUM OF 50'.
2. WIDTH: – 12' MINIMUM, FLARED AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
3. GEOTEXTILE SHALL BE PLACED OVER THE EXISTING GROUND PRIOR TO PLACING STONE.
4. STONE: AGGREGATE (2-INCH MINIMUM, 3-INCH MAXIMUM DIAMETER) SHALL BE PLACED AT LEAST 6" DEEP OVER THE LENGTH AND WIDTH OF THE ENTRANCE.
5. LOCATION: A STABILIZED CONSTRUCTION ENTRANCE SHALL BE LOCATED AT EVERY POINT WHERE CONSTRUCTION TRAFFIC ENTERS OR LEAVES A CONSTRUCTION SITE. VEHICLES LEAVING THE SITE MUST TRAVEL OVER THE ENTIRE LENGTH OF THE STABILIZED CONSTRUCTION ENTRANCE.

MAINTENANCE REQUIREMENTS:

1. INSPECT ENTRANCE PAD WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
2. RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL.
3. TOP DRESS PAD WITH CLEAN STONE AS NEEDED.
4. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED BY BRUSHING OR SWEEPING. FLUSHING SHALL ONLY BE USED IF THE WATER IS CONVEYED INTO A SEDIMENT TRAP OR BASIN.

TYPICAL STABILIZED CONSTRUCTION ENTRANCE DETAIL

N.T.S.

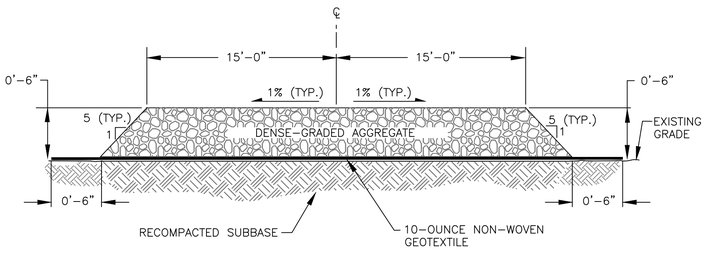


SECTION A–A

PLAN

TYPICAL DECONTAMINATION PAD DETAIL

N.T.S.



NOTE:

1. DENSE-GRADED AGGREGATE SHALL CONSIST OF HARD, STRONG, DURABLE PARTICLES THAT ARE FREE OF ANY MATERIALS, ROOTS, TREES, STUMPS, CONCRETE, CONSTRUCTION DEBRIS, OTHER ORGANIC MATTER, AND DELETERIOUS MATERIALS. DENSE-GRADED AGGREGATE SHALL HAVE A MINIMUM LIQUID LIMIT OF 25, A MAXIMUM PLASTICITY INDEX OF 3, AND SHALL MEET THE GRADATION REQUIREMENTS SET FORTH BY THESE SPECIFICATIONS AS GIVEN BELOW AND AS DETERMINED BY ASTM C-136:

SIEVE SIZE	PERCENT PASSING
1-INCH	100
3/4-INCH	70-100
1/2-INCH	--
3/8-INCH	50-80
No. 4	30-65
No. 30	10-40
No. 200	4-13

ACCESS ROAD DETAIL

N.T.S.

RADFORD ARMY AMMUNITION PLANT
RADFORD, VA

SECTIONS AND DETAILS

ARCADIS

FIGURE 3

CITY/DIV/ DIV/GROUP/ENV DB: PIC PM: TM: TR: PROJECT NUMBER
E:\RVA\Active\ACTIVE\RRAAP_Admin_Action\Archive\Drawings\FIG 3 SECTION & DETAILS.DWG LAYOUT: DETAILS SAVED: 9/3/2015 1:13 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: - PLOTSTYLETABLE: - PLOTTED: 9/3/2015 1:34 PM BY: HIBBERDSON, TOBI

Appendix A

Site-Specific Health and Safety Plan

Appendix A

Site-Specific Accident Prevention Plan

Bag Loading Area and Igniter Assembly Area New River Unit Remedial Action

Radford Army Ammunition Plant

Radford Virginia

December 2010

Jace'que Powell
Designated H&S Plan Preparer

Chris Kalinowski, P.E.
Site Manager

Diane Wisbeck
Project Manager

Appendix A

Site-Specific Accident Prevention Plan

Bag Loading Area and Igniter Assembly Area New River Unit Remedial Action

Prepared for:
U.S. Army

Prepared by:
ARCADIS U.S., Inc.
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Tel 713.953.4800
Fax 713.977.4620

Our Ref.:
GP08RFAAP.0044

Date:
December 2010

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2 Job Loss Analyses

3 Health and Safety Plan Forms

4 ARCADIS Respiratory Protection and Medical Monitoring

5 Site Supervisor Training Certificates

6 Asbestos Abatement Worker Training Certificates

7 Scaffolding and Fall Protection Training Certificates

8 Emergency Response Action Plan - Contacts and Route to Hospital

9 Utility Clearance Procedure

10 Lead Health and Safety Procedure

11 ARCADIS Excavation and Trenching Procedure

12 Material Safety Data Sheets

List of Acronyms and Abbreviations

ACM	Asbestos Containing Material
AEC	Army Environmental Command
APP	Accident Prevention Plan
BLA	Bag Loading Area
CARB	California Air Resource Broad
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
DART	Days Away and Restricted Time
EMR	Experience Modification Rating
FAM	Fibrous Aerosol Monitor
ft bgs	Feet Below Ground Surface
HASP	Health and Safety Plan
H&S	Health and Safety
HSMS	Health and Safety Management System
IAA	Igniter Assembly Area
IRP	Installation Restoration Program
LPO	Loss Prevention Observation
LPS	Loss Prevention System
MMA	Main Manufacturing Area
NIOSH	National Institute for Occupational Safety and Health
NRU	New River Unit
PBC	Performance Based Contract
PCM	Phase Contrast Microscopy
PHSM	Project Health and Safety Manager
PM	Project Manager
PPE	Personal Protective Equipment
RFAAP	Radford Army Ammunition Plant
RAL	Remedial Action Level
SSO	Site Safety Officer
TEM	Transmission Electron Microscopy

TM	Task Manager
TRIR	Total Recordable Incidence Rate
USACE	United States Army Core of Engineers
USEPA	U.S. Environmental Protection Agency

1. Signature Sheet

Site-Specific Accident Prevention Plan
Bag Loading Area and Igniter Assembly Area New River Unit (RFAAP-044)
Radford, Virginia
Contract No. (W91ZLK-05-D-0015: Task 002)

a. Plan preparer (Qualified Person, Competent Person, such as corporate safety staff person, QC);

Jace'que Powell, Designated H&S Plan Preparer
(713) 953-4807

b. Plan approved, by company/corporate officer authorized to obligate the company

Chuck Webster, CSP, Designated H&S Plan Reviewer
(315) 671-9297

c. Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional, project QC).

Diane Wisbeck, Project Manager
(410) 923-7834

2. Background Information

a. Contractor

ARCADIS U.S., Inc. (ARCADIS), has been retained by the U.S. Army Environmental Command (AEC) to provide support to the Installation Restoration Program (IRP) at the Radford Army Ammunition Plant (RFAAP). The RFAAP facility consists of two noncontiguous units: the New River Unit (RFAAP-NRU) and the Main Manufacturing Area (RFAAP-MMA). The IRP activities at RFAAP-NRU, components of which are discussed in this Accident Prevention Plan (APP), are being managed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

b. Contract Number

Performance Based Contract (PBC) awarded to ARCADIS under contract (W91ZLK-05-D-0015: Task 002).

c. Project Name

Radford Army Ammunition Plant, New River Unit (RFAAP-044) – Bag Loading Area and Igniter Assembly Area Removal Actions.

d. Project Description

This Site-Specific Accident Prevention Plan (APP) has been prepared to cover the activities outlined in the Remedial Action Work Plan (RAWP) for the Bag Loading Area and Igniter Assembly Area. The remediation activities at the Bag Loading Area (BLA) and Igniter Assembly Area (IAA) will include the removal of conductive flooring material from building remnants at both sites, as well as the excavation of soils that have been impacted by the degraded flooring material. Both the conductive flooring and the soil have been found to contain asbestos, lead, and copper at concentrations that present risks under certain hypothetical land uses. Benzo(a)pyrene and Aroclor 1254 have also been identified in soil at concentrations that present risks under certain hypothetical land uses. Due to the presence of asbestos, the conductive flooring and soil excavation work will be performed according to asbestos abatement guidelines. ARCADIS has subcontracted the majority of the remediation activities to Winter Environmental, Inc.; however, ARCADIS will provide project oversight to ensure the work is performed according to the RAWP and that the work is performed safely. ARCADIS will also provide asbestos abatement project monitors.

A listing of the Primary Health Hazards [i.e., constituents of concern (COCs)] at the BLA and IAA job sites is provided in Attachment 1.

e. Location of Project

The RFAAP-NRU facility is located in the mountains of southwestern Virginia in the Great Valley subprovince of the Valley and Ridge Physiographic Province. The RFAAP-NRU encompasses approximately 2,813 acres of Pulaski County, Virginia, near the town of Dublin (see Figures 1-1 and 1-2 in RAWP). Active manufacturing operations at the facility ended in 1945, at the completion of World War II. The RFAAP-NRU currently serves as a storage facility for on-going operations at RFAAP-MMA. The storage facilities consist of magazine type buildings that are primarily located throughout the eastern portion of the RFAAP-NRU. Paved surface roads run throughout the facility to provide access to the storage magazines and areas utilized during historical operations at the site.

Despite the historical manufacturing operations that took place at the RFAAP-NRU, and its current use as a storage facility for the MMA, the majority of the land area consists of undeveloped grasslands, heavily forested areas, and agricultural tracts. A portion of the property has recently been converted for use as a military cemetery. The two areas utilized during the historical manufacturing operations, now identified as the Bag Loading Area (BLA) and the Igniter Assembly Area (IAA), are reverting back to more natural conditions as trees, shrubs, and grasses have grown in the open areas of these sites. The BLA and IAA are all located in the western half of the RFAAP-NRU facility and encompass a small percentage of the total land area at the RFAAP-NRU. The location of the BLA and IAA sites within RFAAP-NRU are depicted in Figure 2-1 for the RAWP.

With the exception of the storage magazines and a few maintenance/support buildings, very few active structures remain at the RFAAP-NRU. The buildings at the BLA and the IAA that were utilized during the historical manufacturing operations at the site have been largely dismantled. The wooden roofs and walls that were a part of the BLA and IAA buildings have all been removed, leaving only concrete foundations and concrete blast walls.

The BLA is located near the southwestern boundary of the RFAAP-NRU. The BLA ran two powder bag loading production lines from 1941-1943. Ten buildings were once located onsite; however, all process equipment, wooden roofs, and wooden walls have been removed from the buildings, leaving only concrete slabs and concrete walls. The

concrete slab floors in seven of the buildings (including the second story floors of former Buildings 404 and 407) were covered in a conductive flooring material that contained various metals and asbestos. Removal of the walls and roofs of the buildings has exposed the conductive flooring to weathering, causing it to degrade and break away from the underlying concrete. In some cases, the flooring has degraded into a red powder-like material that has washed onto the surrounding surface soils.

Topography in the immediate vicinity of the BLA buildings is generally flat. Vegetation is mostly limited to grass and small shrubs, although several trees have also grown adjacent to several of the buildings. Surface water is drained through a series of drainage ditches and culverts.

The IAA is located in the western portion of the RFAAP-NRU. Buildings at the site were used for igniter assembly, as well as the shipping and receiving of materials related to the IAA. The main igniter assembly buildings (Buildings 8102-1 through 8102-8) and multiple outparcel buildings at the IAA had a conductive flooring material similar to the BLA. The buildings were constructed with conductive flooring to prevent build up of static electrical charges which could have potentially ignited explosive materials during assembly operations. This flooring material contains various heavy inorganics and asbestos and was exposed to the weather when the wooden roof and walls were removed from the buildings. As a result, the conductive flooring has degraded into a red powder-like substance very similar to what has been observed at the BLA. In many areas, the degraded conductive flooring material has washed off the concrete pads onto surrounding surface soils.

The areas surrounding the main assembly buildings and multiple outparcel buildings are generally flat and vegetated with tall grass, shrubs, and pine trees. Previously maintained grassy areas have been allowed to revert to more natural conditions. An engineered drainage system around the IAA consists of a series of culverts to divert water to ditches which eventually drain into the unnamed creek that provides drainage for much of the RFAAP-NRU. However, the length of the unlined ditches suggests that runoff from normal rain events would infiltrate prior to arriving at the creek.

f. Phases of Work

The following table presents the anticipated phases of work and a brief description of the work to be performed during each phase:

Phase Description	Field Tasks
Phase 1: Project Planning and Mobilization	
This phase of work involves preparation/planning for field work as well as mobilizing equipment and personnel to/from the site.	Driving to/from Site
	Utility Location
Phase 2: Site Clearing Work	
This phase of the work involves clearing vegetation from the BLA and IAA sites to allow access to the work areas. The clearing activities will be focused around the building remanants where conductive flooring material is present	Subcontractor Mobilization
	Tree/Vegetation Clearing and Chipping
Phase 3: Conductive Flooring Abatement Work	
This phase of work involves the removal of conductive flooring material from the BLA and IAA building remnants. The flooring is known to contain both asbestos and lead. Air monitoring will be performed for both asbestos and particulates throughout the work activities in order to evaluate potential worker exposure to airborne asbestos and/or lead containing dust. The work will require the erection of containment units around the conductive flooring abatement work areas. Some of the work will require work from elevated surfaces.	Construction of Asbestos Abatement Enclosures
	Asbestos Abatement
	Asbestos and Particulate Air Monitoring
	Scaffolding Erection
	Use of Fall Protection
Phase 4: Soil Excavation	
This phase of work includes the excavation of soils located adjacent to the buildings at the BLA and IAA where conductive flooring was present. The soils are known to contain asbestos, lead, and copper. Air monitoring will be performed for both asbestos and particulates throughout the work activities in order to evaluate potential worker exposure to airborne asbestos and/or lead and copper containing dust.. Confirmation sampling will be performed to document that remedial goals have been achieved.	Silt Fence Installation
	Excavation and Loading Soils
	Air Monitoring for Asbestos and Particulates
	Confirmation Soil Sampling
Phase 5: Site Restoration	
This phase of work includes the placement of clean backfill material in the excavation areas and reseeding the area to establish erosion control.	Place clean backfill material in excavation areas
	Seeding

ARCADIS has prepared Job Loss Analyses (JLAs) and/or Health and Safety Procedures for each of the tasks, or related activities, outlined above. The purpose of the JLAs and procedures is to outline the hazards associated with each phase/task and the protective measures that should be utilized to mitigate the risks. The JLAs also discuss any PPE that is required for the performance of the task. Copies of the JLAs and/or health and safety procedures are provided in Attachment 2.

It should be noted that ARCADIS will be utilizing the services of a subcontractor (Winter Environmental) for the performance of many of the tasks outlined above. In the event that the subcontractor's procedures differ from those of ARCADIS, the work will be conducted according to the more stringent health and safety guidelines.

g. Contractor Accident Experience Modification Rate (EMR)

The table below outlines the ARCADIS accident and safety record.

Year	TRIR (hr/year)	DART (days)	Lost Time Incident	Recordables	EMR
2006	0.92	0.3	0.13	28	0.97
2007	0.61	0.03	0.03	21	0.97
2008	0.46	0.03	0.03	18	0.80
2009	0.49	0.17	0.17	17	0.78

3. Statement of Safety and Health Policy

a. Purpose

ARCADIS is an international company that delivers consulting, engineering and project management services in the practice areas of infrastructure, environment and facilities. It operates under the set of ARCADIS General Business Principles that is implemented through the organizational structure. In the AGBP, it is stated that ARCADIS, (including ARCADIS-U.S.) provides healthy and safe working conditions for its employees.

ARCADIS-U.S. also operates under seven core values, one of which focuses on health and safety and reads: “We are committed to a healthy, safe and secure work environment for our employees, clients, subcontractors and the public.”

The Health and Safety (H&S) commitments made in the ARCADIS General Business Principles and the Core Values are supported in document AR HSMS000 – ARCADIS-U.S. Health & Safety Management System (HSMS), which describes the general framework for how the ARCADIS-U.S organization manages its H&S risks.

b. Scope

The policy and associated procedures apply to all operations and activities conducted by ARCADIS-U.S. in all locations at which it operates including all project sites.

c. Responsibilities

ARCADIS U.S. Senior Leadership is responsible for the implementation of this overall HSMS within ARCADIS U.S. Senior leaders are responsible for stewarding H&S and developing a culture that allows the company to achieve its H&S vision and operate within the H&S Policy and Health and Safety Procedures.

Senior Leadership establishes periodical reviews and revises, as necessary, the ARCADIS U.S. H&S Vision and Policy to ensure they are relevant to the operational and business goals of the company. Senior leaders encourage and allow for the development of a business culture that embraces the commitments made in the H&S Vision, and the actions defined in the H&S Policy.

ARCADIS U.S. management team members demonstrate visible H&S leadership in their organizations, communicate the H&S Vision and Policy, establish specific H&S objectives and targets and communicate them to their staff.

Senior leaders demonstrate leadership and commitment through visits to operations and company locations; the implementation of the H&S Vision and Policy; setting of H&S objectives; tracking, monitoring and acting on H&S performance data; applying the H&S assurance process; communicating internally and externally, such as published speeches, client meetings, and employee discussions; and personal involvement in the review process of significant incidents. They set a personal example and hold staff accountable for H&S management and performance.

Business Practice Directors and Managers have the responsibility to steward the H&S program to help make H&S a differentiator for us in the market place. To accomplish this, BPMs and BPDs have the responsibility to know and understand our H&S program, policy, vision, and this Health and Safety Procedure (HSP) in detail enough so as to be prepared to explain it to a client when required.

Project Managers (PMs) and Principals in Charge (PICs) have the responsibility for incorporating health and safety into the earliest stages of the project and project planning process per the ARCADIS Project Management program. This includes integrating H&S into the Go/No Go decision process, the project planning process, project execution, and project closeout. H&S should be considered in all aspects of planning, scheduling and budgeting a project. PMs and PICs also have the responsibility to know and follow all applicable ARCADIS and client H&S requirements, for ensuring work is conducted under the policy stated in this HSP, and for implementing the procedure requirements provided for in this HSP on any project and/or in offices that pose hazards to ARCADIS employees or employees of its subcontractors, clients, and other organizations present in the vicinity of work controlled by ARCADIS.

For project-related work, Project Managers and PICs responsibilities also include determining and communicating any specific client requirements that are applicable, including:

- Communicating with and appropriately managing subcontractors, ensuring that
- employees have appropriate training and qualifications prior to work commencing, and ensuring all client H&S requirements are met;

- Involving the appropriate ARCADIS H&S Staff and project client staff, as necessary;

- Ensuring that all subcontractors have been communicated with concerning the minimum H&S requirements for the project;

- Using the H&S resource pool as appropriate to meet specific requirements.

In addition, as project and client agents and on behalf of ARCADIS, the Project Managers and PICs for client-related work shall be responsible for:

- Understanding and compliance by employees with H&S rules and the requirements;

- Guaranteeing each employee the absolute right to “Stop Work Authority” in good faith

- Using the ARCADIS Incident Investigation process for formally resolving a “Stop Work” condition.

Using this “Stop Work Authority” process, the manager and the employee will:

- Discuss and document the condition;

- Identify and document the root causes for the condition;

- Determine and document the solutions;

- Implement the solutions; and

- Acknowledge the solutions are in place to the satisfaction of the employee

U.S. H&S Director has the responsibility for:

- Communicating the policy and procedure requirements in this HSP with all offices within ARCADIS – US including divisional H&S Managers;

- Ensuring that offices are aware of this HSP;

- Ensuring it is being implemented effectively;

- Serving as the H&S Adviser for the U.S. and on the Global H&S Committee for ARCADIS

Health and Safety Department Personnel including Divisional H&S Managers and PIC and Client H&S Support Personnel are responsible for facilitating the policy and procedure requirements in this HSP in their assigned areas, clients, or groups and for providing "hands-on" assistance to ARCADIS staff to ensure this procedure is implemented appropriately

Staff and Department Managers and Supervisors have the responsibility to provide oversight management for the H&S of employees in their respective operations. Each will assure that appropriate time is provided to facilitate the implementation of this HSP. In addition, the managers and supervisors will involve themselves in any "Stop Work" issued by an employee as appropriate to assist in resolving the employee's concerns.

ARCADIS employees have the responsibilities to adhere to this HSP and associated HSPs, JSAs, H&S plans, and other documents and requirements and to communicate H&S concerns, issues and questions to their supervisor or as H&S Department staff member. In addition, all employees have the responsibly to:

- Use the TRACK process prior to any activity

- Follow all ARCADIS and client requirements;

- Understand and appropriately utilize the "Stop Work Authority" concept.

As part of this commitment, ARCADIS has integrated the Loss Prevention System™ (LPS) into our existing health and safety (H&S) program as a tool to help prevent injuries and incidents and to support continuous improvement in our H&S performance.

4. Responsibilities and Lines of Authorities

a. Project Personnel

Project personnel who play a vital role in the project safety and health program are described below:

Diane Wisbeck - The Project Manager will establish and interpret all contract policies and procedures, and access appropriate ARCADIS resources in order to maintain technical quality and that all health and safety requirements are being implemented.

Christopher Kalinowski - The Site Manager/Associate Project Manager will help the Project Manager assign the field oversight personnel and oversee the implementation of all schedules and budgets.

Some additional responsibilities of the project manager are as follows:

- Review all applicable H&S Procedures, and ensure that project activities conform to all requirements.
- Obtain client-specific health and safety information and communicate with the client on health and safety issues.
- Communicate with the Site Safety Officer (SSO) on health and safety issues.
- Allocate resources for correction of identified unsafe work conditions.
- Ensure ARCADIS site workers have all training necessary for the project.
- Report all injuries, illnesses and near-misses to the Client H&S Resource or Project H&S Manager (PHSM), lead incident investigations, and ensure that any recommendations made are implemented.

Additional personnel designated to carry out H&S job functions for the project, and their responsibilities are listed below. The same person may fill more than one role:

ARCADIS Project Team	Responsibility and Tasks
Keith Carr	**SSO** • Reviews and works in accordance with the components of this APP. • Ensures that the Site-Wide HSP and this APP is available to and reviewed by all site personnel including subcontractors. • Ensures that necessary site-specific training is performed (both initial and "tailgate" safety briefings. • Ensures site visitors have been informed of the hazards related to ARCADIS work, and have signed the Site Visitors Log. • Ensures that work is performed in a safe manner and has authority to stop work when necessary to protect workers and/or the public. • Coordinates activities during emergency situations. • Ensures that all necessary permits and safety information provided by the client is disseminated to other site personnel and is maintained in an organized manner. • Communicates with the PM, Client H&S Resource and/or the PHSM on health and safety issues. • Reports all injuries, illnesses and near-misses to the PM, Client H&S Resource and PHSM. • Ensures that necessary safety equipment is maintained and used at the site. • Contacts a health and safety professional for assistance in establishing the respiratory cartridge change schedule as required.
Robert White Sandy Grabowski Dave Forrand Subcontractor Employees (Winter Environmental)	**Site Workers** • Reads and works in accordance with the components of the Site-wide HSP and this APP. • Reports all unsafe working conditions to the SSO. • Reports all injuries, no matter how minor, to the SSO. • Works in a safe manner. • Signs the HASP acceptance log in Attachment 3.
Chuck Webster, CSP	**Project Health and Safety Manager** The PHSM oversees all aspects of the site safety program, and prepares site-specific health and safety guidance documents or addenda to this plan. The PHSM does not report to the Project Manager, and is separately accountable to the ARCADIS project team for site health and safety. The PHSM acts as the sole contact to regulatory agencies on matters of safety and health. Other responsibilities include: • Overall authority for health and safety compliance and conformance

ARCADIS Project Team	Responsibility and Tasks
	with the Site-Wide HSP and this APP for the project. • General health and safety program administration. • Conducts project health and safety audits as warranted. • Determines the level of personal protection required. • Updates equipment or procedures based on information obtained during site operations. • Establishes air-monitoring parameters based on expected contaminants. • Assists in injury, illness and near-miss investigations and follow-up.
Client Contact – Matt Alberts	**Client Health and Safety Resource** The designated Client H&S Resource is responsible for : • Assisting the SSO in issues as they arise. • Performing site audits and assessments. • Assisting with near-miss/incident investigations. • Serves as the liaison with corporate during H&S regulatory issues as they may arise.

b. Management

The management of ARCADIS is committed to providing employees with a safe and healthy work environment. ARCADIS managers are responsible for implementing and fostering a positive and proactive regard for company health and safety programs and policies. ARCADIS employees are responsible for complying with company health and safety policies and programs to ensure our own safety as well as the safety of our co-workers.

Employees must report all accidents, injuries, and unsafe conditions to their manager or the Office Administrator. No such report will result in any retaliation, penalty, or other disincentive. Management will take disciplinary action against any employee who willfully or repeatedly violates office safety rules, or who does not report unsafe conditions. This action may include written reprimands up to and including termination.

The primary responsibility for the coordination, implementation, and maintenance of our office safety program resides with our Human Resources Department and Office

Administrator. You are encouraged to call the Corporate Health and Safety Manager in Denver if you have any questions, comments, or suggestions on company health and safety policies and programs.

This policy statement serves to express our commitment to and involvement in providing our employees a safe and healthy work environment. Our office health and safety program will be the standard of practice for this office. Compliance with this health and safety program will be required of all employees as a condition of employment.

Keith Carr has completed 30 hour construction course or equivalent course and will be responsible for oversight of field construction activities. If Keith Carr is not on Site, ARCADIS will have other personnel on Site that has completed the 30 hour construction course or equivalent courses.

Keith Carr will serve as the SSO and will ensure that all health and safety procedures are followed. Additional duties of the SSO are provided in section 4a.

c. Competent/Qualified Personnel

Charles Webster, CSP, will serve as the Project and Regional Health and Safety Manager and will review and accept all qualifications of field personnel prior to construction activities. All personnel will be qualified to perform the activities assigned to them. A copy of Mr. Webster's resume is included in Attachment 5.

4.c.1 HAZWOPER and Respiratory Protection

All ARCADIS field personnel will have completed the OSHA 1910.120 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training. All personnel assigned for on-site activities are, or will be, enrolled in a respiratory protection program and will have medical clearance to wear a respirator in the event that their work activity requires respiratory protection. Copies of the medical clearance and fit testing documentation for ARCADIS employees will be kept on-site and are provided in Attachment 4.

4.c.2 Construction Oversight

Keith Carr (ARCADIS) has completed a 30 hour construction course or equivalent course and will be responsible for oversight of any field construction activities. If Keith

Carr is not on Site, ARCADIS and/or the subcontractor performing the remediation/abatement activities (Winter Environmental), will have other personnel on Site that have completed the 30 hour construction course or equivalent courses. Copies of the training certificates for Keith Carr as well as the Winter Environmental Site-Supervisors (Larry Chambers, Wayne Harper, and Gabriel Smith) are provided in Attachment 5.

ARCADIS will have asbestos abatement project monitors on-site during performance of the conductive flooring removal and excavation activities to provide oversight of the abatement activities and to conduct exposure monitoring. Copies of the training certificates for Mr. Kevin Hardy and for Mr. Dave Forrand are also provided in Attachment 5.

4.c.3 Asbestos Abatement Workers

ARCADIS will be utilizing the subcontract services of Winter Environmental to perform the conductive flooring removal and soil excavation activities at the BLA and IAA project sites. Due to the presence of friable asbestos in the conductive flooring material and soil, this work will be performed only by licensed/qualified asbestos abatement workers. Copies of the Asbestos Abatement Supervisor/Worker Training Certificates for the Winter Environmental staff that will be performing the abatement activities are provided in Attachment 6. Also provided in Attachment 6 are copies of the respirator fit testing and medical monitoring documentation for the Winter Environmental abatement workers. In the event that additional personnel are required for performance of the work, they will be required to provide proof asbestos training and involvement in a respirator fit testing and medical monitoring program and records of such will be kept on-site.

Only ARCADIS's asbestos abatement project monitors will be permitted to enter the asbestos abatement enclosure units.

4.c.4 Scaffolding and Fall Protection

The conductive flooring abatement activities at the BLA will require the use of scaffolding and fall protection to access elevated work surfaces at two of the former buildings. Scaffolding will only be erected under the direction of qualified personnel from Winter Environmental with OSHA training on the installation and inspection of scaffolding. Similarly, the fall protection program for work on elevated surfaces will be overseen by Winter Environmental personnel with OSHA training on the use of fall

protection devices. Copies fo the relevant training certificates for the personnel that will oversee the scaffolding and fall protection work are provided in Attachment 7.

d. Designated Competent Persons

The following personnel have been assigned the role of Designated Competent Person for these activities:

- 30-Hour Construction Outreach: Keith Carr (ARCADIS); Larry Chambers (Winter Environmental)
- Asbestos Abatement: Kevin Hardy (ARCADIS); Larry Chambers (Winter Environmental)
- Scaffolding Erection: Larry Chambers (Winter Environmental)
- Fall Protection: Larry Chambers (Winter Environmental)

The competent person will be responsible for communicating any potential hazards to the SSO and site workers during performance of the work. The SSO and Mr. Charles Webster (ARCADIS) will be responsible for verifying that a competent person is on-site and supervising work during all phases of the remediation activities at the BLA and IAA.

e. Pre-task Safety and Health Analysis

Job Loss Analyses (JLAs) have been prepared for the various phases/tasks that will be performed during the BLA and IAA removal actions as discussed in Section 2.f. The JLAs are provided in Attachment 2. The JLAs have been developed to identify safety concerns with each of the tasks to be performed for the planned remedial actions. The JLAs also discuss the required PPE for the various phases of work/tasks that will be performed at the BLA and IAA. Daily tail gate meetings will be conducted prior to starting work each day and the JLAs will be revised, if necessary, to account for conditions observed in the field. JLAs will also be developed in the field for any tasks not identified in this APP.

JLAs that have been included in this APP include:

- Air Monitoring

- Asbestos Abatement
- Decontamination of Large Equipment
- Decontamination of Small Equipment
- Driving
- Excavation
- Heavy Equipment Operation
- Ladders
- Man-Lift Operations
- Scaffolding
- Fencing Installation
- Site Clearing
- Sample Cooler Handling
- Surface Soil Sampling

f. Lines of Authority

The project team and lines of authority is presented in Section 4a of this APP.

g. Policy and Procedures for Non-Compliance Safety Requirements

At a minimum, ARCADIS will provide a verbal warning for first non-compliance of safety requirements, a written warning for the second non-compliance, and the field personnel will be removed from the Site for a third non-compliance of safety requirements. Non-compliance of safety requirements that could have caused a serious incident or injury will result in removal from the Site.

h. Company Procedure

Project Managers and Principals in Charge (PICs) have the responsibility for incorporating health and safety into the earliest stages of the project and project planning process per the ARCADIS Project Management program. PMs and PICs also have the responsibility to know and follow all applicable ARCADIS and client H&S requirements, for ensuring work is conducted under the policy stated in the ARCADIS U.S. Health and Safety Management System Plan (HSMSP), and for implementing the procedure requirements provided in the HSMSP on any project and/or in offices that pose hazards to ARCADIS employees or employees of its subcontractors, clients, and other organizations present in the vicinity of work controlled by ARCADIS.

5. Subcontractors and Suppliers

a. Identification of Subcontractors and Suppliers

ARCADIS will utilize the following subcontractors to perform activities in support of the planned removal actions at the BLA and IAA.

- Winter Environmental, Inc.: Site clearing, conductive flooring removal, excavation, site restoration.

- Capitol Environmental Services, Inc.: Waste transportation and disposal

b. Safety Responsibilities of Subcontractors and Suppliers

A copy of this APP is to be provided to all subcontractors prior to the start of work so that the subcontractor is informed of the hazards at the site. While the ARCADIS APP will be the minimum health and safety requirements for the work completed by ARCADIS and its subcontractors, each subcontractor, in coordination with ARCADIS health and safety personnel, is expected to perform its operations in accordance with its own HASP, policies and procedures unique to the subcontractor's work to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to ARCADIS for review prior to the start of on-site activities.

In the event that the subcontractor's procedures/requirements conflict with requirements specified in this APP, the more stringent guidance will be adopted after discussion and agreement between the subcontractor and ARCADIS project health and safety personnel. Hazards not listed in this APP, but known to the subcontractor or known to be associated with the subcontractor's services, must be identified and addressed to the ARCADIS project or task manager and SSO prior to beginning work operations.

If the subcontractor prefers to adopt this APP, the **"Subcontractor Acknowledgement Memo" must be signed and dated by the subcontractor's management and placed in the project file.** Once the signed memo is received by the project manager, an electronic version of our APP can be submitted to the subcontractor to use as their own. Subcontractors working at the site will need to have this plan with them, and will also need to sign the Subcontractor HASP receipt signature page of the ARCADIS HASP (Attachment 3). Subcontractors are

responsible for the H&S of their employees at all times, and have the authority to halt work if unsafe conditions arise.

The Project/Task Manager and SSO (or authorized representative) has the authority to halt the subcontractor's operations and to remove the subcontractor or subcontractor's employee(s) from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

6. Training

a. New Hire Health and Safety Training

ARCADIS requires all new hire employees to complete Hazard Communication, Office Emergency Response, Loss Prevention System, Smith Defensive Driving, and 40 hour HAZWOPER training prior to being mobilized to a Site. The 40 hour HAZWOPER training is provided as needed, to those employees that will be assigned to field work activities.

ARCADIS will only permit trained employees onto job sites. Short service employees (less than six months field experience) will be identifiable and will be accompanied by another ARCADIS employee.

b. Mandatory Training and Certifications

Training of ARCADIS field personnel is provided in the table below

Training Required: ☐ None	☒ 40-hour HAZWOPER ☐ 24-hour HAZWOPER ☒ HAZWOPER site supervisor ☒ OSHA 30-hour Construction ☐ OSHA 10-hour Construction ☒ PPE ☒ Respiratory protection ☐ Chemical hygiene ☒ Hazard communication ☐ Hazardous waste ☒ First-aid/CPR ☒ DOT/IATA hazmat transportation ☐ Diving ☐ Other:	☐ Bloodborne pathogens ☐ Confined space ☐ Lockout/tagout ☐ Electricity ☒ Fire extinguishers ☒ Fall protection ☐ Noise exposure ☐ Forklifts ☒ Asbestos ☒ Lead ☐ Cadmium ☐ SPCC ☐ Radiation safety ☐ Client specific
Medical Screening	☒ Medical Surveillance Exam (HAZWOPER) ☐ Client required drug and/or alcohol Testing	☐ Blood and/or urine screening for other hazardous substances

c. Procedures for Periodic Health and Safety Training

All health and safety training provided to ARCADIS employees are kept in a database that allows the employee to track when they need to become recertified in a particular health and safety training.

7. Safety and Health Inspections

a. Daily Inspections

Safety meetings will be conducted twice daily by the SSO for all ARCADIS and visiting personnel and documented on the Daily Tailgate Safety Meeting Attendance Record form provided in Attachment 3 or in the field logbook. The information and data obtained from applicable site characterization and analysis will be addressed in the safety meetings and used to update this APP, as necessary. Inspections of all heavy equipment will be performed daily before work begins and will be document using the ARCADIS heavy equipment checklist provide in Attachment 3.

As part of any project, no matter how simple or complex, Loss Prevention Observations (LPOs) should be conducted when practical and when able to integrate into normal business activities. LPOs should be scheduled based on the risk of the tasks being performed, and should be conducted for different tasks and at different times. Any deficiencies noted during the LPO process should be rectified and the solution(s) documented on the LPO form. Completion of LPOs should be documented on the tailgate meeting form and entered into ARCADIS electronic LPO database system. The ARCADIS Project Manager will be responsible for reviewing all completed LPOs and for verifying with the SSO that solutions for any deficiencies are properly implemented in the field. An example LPO form is provided in Attachment 3.

8. Accident Reporting

a. Exposure Data

The SSO will be responsible for providing exposure data (man-hours worked) during the course of the project. During performance of the conductive flooring and soil excavation activities, personnel exposure monitoring will be conducted to evaluate potential worker exposure to airborne asbestos and dust. Dust monitoring will be performed due to the presence of lead, copper, Aroclor 1254 and benzo(a)pyrene in the soil. The SSO will be responsible for maintaining documentation of all exposure monitoring data.

b. Accident Investigations, Reports, Logs

The SSO will report all injuries, illnesses and near-misses to the PM, Client H&S Resource and PHSM.

Employees must report all accidents, injuries, and unsafe conditions to their manager or the Office Administrator. No such report will result in any retaliation, penalty, or other disincentive. Management will take disciplinary action against any employee who willfully or repeatedly violates office safety rules, or who does not report unsafe conditions. This action may include written reprimands up to and including termination.

The Project Manager and/or Task Manager will report all accidents as soon as possible but not more than 24 hours afterwards to the PHSM (Charles Webster) and the client contact.

c. The following require immediate accident notification

1) A fatal injury;

2) A permanent total disability;

3) A permanent partial disability;

4) The hospitalization of three or more people resulting from a single occurrence;

9. Medical Support

a. On-Site Medical Support

ARCADIS will ensure that at least three members of the field crew (ARCADIS and Winter Environmental employees) will be first aid and cardiopulmonary resuscitation (CPR) trained. In case of injury-illness, ARCADIS field personnel will contact Work Care at (800) 455-6155. Work Care will provide instructions to the field personnel and inform them if injured employee must receive emergency medical attention.

The individuals scheduled to work on-site with CPR and first aid training include:

- W. Keith Carr
- Sandy Grabowski
- Larry Chambers
- Gabriel Smith
- Roger Flores

Copies of the training certificates for these individuals are provided in Attachment 8.

b. Off-Site Medical

ARCADIS field personnel will ensure that emergency medical services are correct. The SSO will practice the route to emergency medical service to make sure the direction provide in Attachment 8 is correct.

c. Route to Emergency Medical Services

Information associated with the route to off-site Emergency Medical Services are provided in Attachment 8.

10. Personal Protective Equipment (PPE)

a. General Requirements

The five primary contaminants of concern that are present at the BLA and IAA project sites at RFAAP-NRU are copper, lead, asbestos, Aroclor 1254, and benzo(a)pyrene. The presence of these COCs in surface soil is the driver for the remedial activities being conducted at the site. A table summarizing the chemical hazard information for these constituents is provided in Attachment 1 to this APP.

Equipment for personal protection will be selected based on the potential for contact with COCs, site conditions, ambient air quality, and the judgment of SSO and the PHSM. The PPE used will be chosen to be effective against the chemicals of concern (COCs) and other hazards present on Site. Refer to JLAs for specific PPE required for given tasks.

Based on job conditions and an assessment of the Site-specific COCs and other hazard potentials, site personnel will conduct work activities in a minimum of the Level D protection. PPE level of protection may be modified or upgraded for certain activities/tasks, or based on new or unforeseen hazards. All disposable equipment garments, and PPE must be bagged in plastic bags for disposal.

The minimum level of protection that is required of ARCADIS personnel and subcontractors at the site will be Level D, which is worn when activities do not involve potential dermal contact with contaminants and there is no indication that no inhalation hazard exists. Level D protection includes the following equipment:

- Work clothing as prescribed by weather;
- Steel-toe work boots;
- Safety glasses with side shields or goggles;
- Nitrile gloves (if handling soils or contaminated water);
- Heavy duty cloth or leather gloves for work not involving the handling of soils or groundwater (cut-resistant if handling potential sharp items);
- Hard hat;

- Hearing protection (if noise levels exceed 85 decibels (dB)); and
- Safety/reflective vests.

Level C protection will be required for the work performed in the asbestos abatement work areas or when the airborne concentration of COC reaches one-half of the OSHA Permissible Exposure Limit (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV). The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with appropriate cartridges for site COCs (HEPA filter);
- Polyethylene-coated Tyvek® suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots;
- Chemical resistant boots with steel toes or latex overboots over steel toe boots;
- Hard hat; and
- Hearing protection (if noise levels exceed 85 dB).

Depending on the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Modified Level D or Level C PPE is used. All personnel entering the exclusion zone (EZ) must put on the required PPE in accordance with the requirements of this APP. When leaving the EZ, PPE will be removed in accordance with the procedures listed to minimize the spread of COCs.

Donning Procedures

These procedures are mandatory only for areas where Level C PPE is used on the site:

- Remove bulky outerwear. Remove street clothes and store in clean location;

- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;
- Don the required respirator and perform appropriate fit check;
- Put hood or head covering over head and respirator straps and tape hood to facepiece; and
- Don remaining PPE, such as hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

Doffing Procedures

The following procedures will be utilized when exiting areas where Level C protection is required. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Remove gross contamination and debris from work clothing using HEPA vacuum in decontamination area;
- Remove protective garments and equipment in the equipment room. All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels. Resusable equipment shall be properly cleaned;
- Employees shall not remove respirators until leaving the equipment room.
- Employees shall shower prior to entering the clean room.

- After showering, proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator for next use.

b. Respirators

All personnel (ARCADIS and subcontractors) required to wear respirators on this project shall be enrolled in a medical monitoring program and approved to wear a respirator. All personnel shall be trained in the proper use of their respirator and have had a qualitative and/or quantitative fit test performed within the last 6 months. Respirators shall be cleaned and disinfected before and after each use, as well as inspected for any signs of damage or excessive wear and tear that may compromise functionality. A functional fit test shall be performed prior to each use. When not in use, all respirators shall be kept in a clean, dry storage area free of dust. All employees required to wear a respirator much maintain facial hair such that it does not interfere with the proper fit of the respirator.

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

11. Plans (Programs, Procedures) Required by the Safety Manual

a. Emergency Procedures

In the event of an emergency situation the SSO is to contact the ARCADIS project manager (Diane Wisbeck) or Health and Safety Manager (Chuck Webster). The ARCADIS Project Manager will contact the client contacts at RFAAP-NRU to advise of the situation. In the event of a medical emergency, the SSO or other field personnel shall call 911 immediately and then the RFAAP fire department first.

1) Posting of Emergency Contact Telephone Numbers and Hospital Route

The emergency contact list and route to the hospital from RFAAP-NRU are provided in Attachment 8 and listed below. The emergency contact procedures and emergency plans will be reviewed with all on-site field personnel each morning during the tailgate health and safety meeting each morning prior to starting work. Copies of the emergency contact list and maps to medical facilities will be posted on all equipment storage buildings and kept in all on-site vehicles.

Emergency Contact List

Emergency Contact	Phone
Local Police – Dublin Police Department	911 or 540.674.5167
Local Ambulance	911
Local Fire Department - Radford Fire Department	911 or 540.693.7323 **Dial 9911 on plant phone in case of fire
New River Unit Security Post	540.674.4988
Local Hospital Carilion New River Valley Medical Center 2900 Lamb Circle, Christianburg, VA	540.731.2000
Work Care	800.455.6155
Poison Control	800. 332.3073

National Response Center (all spills in reportable quantities)	800.424.8802
U.S. Coast Guard (spills to water)	804. 441.3516
Project Manager – Diane Wisbeck	410.987.0032(O): 410.963.0050 (C)
Site Project Manager – Chris Kalinowski	919.854.1282(O); 919.656.7731(C)
Site Manager – James McKenna	540.731.5782
Project H&S Manager – Chuck Webster	315.247.5971
Client Contact – Jerry Redder	540.693.7536(O) 540.239.2990 (C)
Client Contact – Matt Alberts	540.639.8722 (C) 540.230.3294 (O)
Emergency Coordinator – Diane Wisbeck	410.987.0032(O); 410.963.0050 (C)

C – cell phone; O – office phone

2) Spill Plans

In case of spills, work will be stopped. Absorbents, neutralizing materials, and proper PPE will be used to control the spill. The SSO will coordinate the entry and exit of response personnel during an emergency and make emergency contacts as necessary. After immediate notifications are made, the SSO will contact the Project Manager.

Hazardous material waste (i.e., vehicle and equipment oils and lubricants, containers and drums for solvents, etc.) shall be collected, stored, and disposed of in accordance with Federal, State, local requirements.

3) Firefighting Plan

In accordance with RFAAP policy, fire extinguishers must be maintained in all vehicles that enter the RFAAP-NRU facility. .Additionally fire extinguishers will be kept within 25 feet of all work areas during performance of any work activities at RFAAP-NRU. To the extent practical, any small sparks/fires shall be extinguished

immediately. In the event of larger fires, or fires unrelated to the remediation activities, all site personnel are to retreat to the designated rally point (determined during daily tailgate meeting) and the SSO will contact the RFAAP fire department.

4) Medical Support

First aid kits will be available at areas most accessible to employees and in the proximity of those areas where accidents are most likely to occur. The SSO will be responsible for keeping the first aid kits adequately supplied. First aid kits will be provided at a ratio of one for every 25 employees. The presence of fewer than 25 employees on site still warrants a first aid kit to be on site. The SSO will ensure that first aid kits are available on the worksite and that these locations are known to all employees on the premises. Eyewash kits will be included with the first aid kits located in the cab of the ARCADIS vehicle. The SSO will make checks of the first aid equipment at each location. As a measure to provide immediate first aid attention to personnel who suffer minor injuries, there shall be a minimum of two people with Red Cross First Aid and CPR training present on site at all times.

b. Plan for Prevention of Alcohol and Drug Abuse

The use and/or possession of alcoholic beverages and illegal drugs are not permitted on site. The use of such substances can significantly impair judgment in the field. Personnel under the influence, or suspected of being under the influence, of alcohol or illegal drugs will not be allowed on site.

Personnel using prescription and over-the counter drugs will inform the On-Site Safety Officer of any warnings listed on the drug container.

c. Site Sanitation Plan

ARCADIS' subcontractors will provide portable restrooms and hand washing facilities on Site during construction activities. Eating, drinking, and smoking will only be permitted in designated areas of the site. Drinking water and/or gatorade will be placed in a cooler on ice for all field personnel.

d. Heat/Cold Stress Monitoring Plan

Workers may be required to wear protective clothing that insulates the body. A hazard may exist if workers wear protective clothing in elevated temperatures. At any time the

ambient temperature exceeds 70º F, or at the discretion of the On-Site Safety Officer, heat stress monitoring will be conducted and the number of rest periods will be increased.

Symptoms of heat stress are usually seen in the following stages:

- Behavioral disorders - Inability to concentrate, impaired performance, loss of coordination
- Skin Eruptions - Prickly heat, red raised areas of skin, skin that isn't sweating
- Heat Exhaustion - Fatigue, nausea, headaches, giddiness, clammy skin, pale complexion, fainting
- Heat Stroke - Hot, dry skin, confusion, loss of consciousness, convulsions, and death

To minimize heat stress, the following preventative procedures will be implemented.

- The number of rest periods will be increased. Air-conditioned facilities or shaded areas must be provided for rest periods so that workers can adequately recover.
- A supply of cool (non-alcoholic, non-caffeinated) liquids, preferably water, should be kept on site. Fluid intake should match amount of fluids lost through sweating.
- Water chill vests and ice vests should be available to minimize heat stress.
- Choose PPE with the lowest insulating properties, while still providing adequate protection against chemical hazards.
- Adjust work schedules so that heavy work is completed during cooler hours, such as early mornings or early evenings.
- Rotate personnel to prevent a single worker from heat stress.

Prolonged exposure to excessive cold and/or wet conditions may cause excessive loss of body heat (hypothermia), frostbite, slurred speech, memory lapses, drowsiness, incoherence, shivering or severe shaking.

Protective clothing and PPE are essential to prevent hypothermia. The correct clothing depends on the specific cold stress situation. It is important to preserve the air space between the body and the outer layer of the clothing in order to retain body heat. Wearing clothing in multi-layers is preferred as it produces more air pockets which provide better insulation. Clothing worn under PPE should be made of thin synthetic fabric, which helps to evaporate sweat by wicking it to the surface. The insulating effect is negated if the clothing interferes with the evaporation of sweat, or if the skin or clothing is wet. The most important parts of the body to protect are the feet, hands, head and face.

Working in cold areas also causes significant water loss through the skin and lungs as a result of the dryness of the air. Increased fluid intake is essential to prevent dehydration. Warm, sweet, caffeine-free, non-alcoholic drinks and soups should be made available for fluid replacement and caloric energy.

Both the outdoor temperature and the wind velocity play a part in cold injuries. Wind chill is used to describe the chilling effect of moving air in combination with low temperatures. Cold exposure may be a serious threat to any site workers that remove protective clothing, or expose perspiration soaked underclothing to the cool air. Water conducts heat 240 times faster than air, rapidly cooling the body and wet clothing. Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperatures.

Symptoms of hypothermia are usually seen in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and rapid body cooling
- Unconsciousness, glassy stare, slow pulse and respiratory rates
- Freezing of the extremities (most sensitive to freezing first are the fingers, toes and ears)
- Death

Recommended actions to avoid suffering the effects of cold exposure:

- Wear non-cotton undergarments to wick perspiration from the body.

- Wear additional layers of light clothing as needed for warmth. The layering effect holds in air, trapping body heat and some layers could be removed as the temperature rises during the workday. Caution: Wearing too much clothing will cause sweating, which may freeze next to the body, creating a hazard.

- Each worker must pay close attention to his/her body, and take the appropriate action to correct any symptoms of hypothermia (such as break from work activity and move to rest area to warm up, add additional clothing).

- Install a windbreak at the work site to break the cold winds from blowing directly on the crew.

- Maintain good eating and drinking habits, enabling the body to operate at top capacity (i.e., avoid alcohol).

e. Contingency Plan for Severe Weather

The remediation activities at the BLA and IAA project sites are scheduled to occur during the Fall/Winter months. As such the potential for frozen precipitation or other inclement weather (e.g., rain, snow, flooding, etc.) is possible. Weather conditions will be monitored closely by the SSO and Project Manager throughout the duration of the remediation activities. In the event the adverse weather is forecast or occurs, the SSO and Project Manager will evaluate whether work and/or travel can proceed based on observed conditions. All work will be suspended immediately in the event of electrical storms and will not be allowed to resume for a period of 30 minutes following the last observable lightning strike.

f. Night Operations Lighting Plan

Work will only be performed during daylight hours during the BLA and IAA removal actions.

g. Utility Clearance Plan

Due to the potential for subsurface utilities to be present on-site, ARCADIS will perform utility clearance activities prior to commencing any intrusive (e.g., excavation) activities at the BLA or IAA. The utility clearance will be conducted in accordance with the ARCADIS Utility Location Policy and Procedure provided in Attachment 9. In addition to calling the Virginia Miss Utility of Virginia (811), a three point utility clearance will be

performed prior to initiating any intrusive work at the Site. The three point utility clearance will consist of the following activities: (1) ARCADIS will coordinate with RFAAP to review the scope of work and identify any utility lines that may be located in the work areas, (2) a records review will be conducted to review all available drawings/information that can aide in identifying and locating adjacent underground utilities/structures, (3) a private utility locator (Mid-Atlantic Utility Locating, LLC) will be retained to locate underground lines/structures by applying surface geophysical methods in the areas where intrusive work will be conducted. Finally, ARCADIS will conduct a visual inspection of the work areas for marked subsurface utility locations, manholes, and other evidence of subsurface utilities.

h. Vegetation Clearing Plan

The selective removal of vegetation will be required from both the BLA and IAA sites to provide sufficient room for staging areas and accessing the work/excavation areas around the former buildings. Clearing of above ground vegetation will be conducted using hand tools and heavy equipment. After removal, the above ground vegetation will be temporarily staged, then chipped and spread on-site and left for decomposition. Grubbing of the site will not be required. Root stumps that are present within the excavation areas will be considered impacted by contaminated soil; and thus removed and disposed of accordingly during the excavation process (i.e., disposed of with the impacted soil to a properly permitted landfill). The clearing and chipping activities shall be performed in accordance with the JLAs provided in Attachment 2. Required PPE for the vegetation clearing activities are also outlined in the JSAs provided in Attachment 2.

i. Respiratory Protection Plan

Inhalation and ingestion are the primary routes of exposure for the COCs [i.e., copper, lead, asbestos, and Aroclor 1254, and benzo(a)pyrene] that have been identified at the BLA and IAA project sites. Symptoms of exposure and permissible exposure limits for the identified COCs are provided in Attachment 1.

Review of the required scope of work for the removal actions at the BLA and IAA has indicated that the tasks related to the conductive flooring removal phase of work and the excavation phase of work could result in potential for exposure to COCs via the inhalation pathway. Therefore, a respiratory protection program will be utilized to evaluate potential exposures and to protect site workers. The respiratory protection

program will include the use of PPE (i.e., full-face or half-face respirators) and an air/exposure monitoring program.

Respirators will be required for all workers performing the conductive flooring and soil excavation activities, or when a worker is required to enter one of the regulated areas identified for these phases of work. Any employee who is required to wear a respirator during performance of the remediation activities at the BLA and IAA will be enrolled in a medical monitoring program as required by 29 CFR Section 134 - Respiratory Protection. Site workers will also be required to certify that they have been properly fit tested for their respirator.

Personnel and area exposure monitoring, as required by OSHA for the asbestos abatement activities, will be documented on the Real Time Exposure Monitoring Data Form provided in Attachment 3. The details on the personnel and area exposure monitoring activities that will be performed for the BLA and IAA conductive flooring removal activities and for the excavation activities are outlined in Sections 11.m and 11.o. All monitoring equipment will be maintained and calibrated in accordance with manufacturer recommendations. All pertinent monitoring data will be logged on the form and maintained on Site for the duration of project activities. Calibration of all monitoring equipment will be conducted daily and logged on the same form.

Both dust monitoring and asbestos monitoring will be performed at the BLA and IAA project sites. The tables below lists the exposure monitoring frequency and action levels for the primary site exposure hazards. The action levels presented for dust are protective of worker exposure to the COCs that have been identified in soil at the BLA and IAA sites, with the exception of asbestos [i.e., lead, copper, benzo(a)pyrne, and Aroclor 1254]. The action levels for asbestos, which will be evaluated using both area and personnel air monitoring, are also presented in the table. Note that the action levels for asbestos will likely be the driver for the respiratory protection program because asbestos has the highest potential for becoming airborne during the performance of the work. The respiratory protection for asbestos (i.e., full-face respirators with HEPA filtration) will also be protective of the other COCs present at the site.

TASK –Excavation activities Is exposure monitoring required for the completion of this project? ☒ YES ☐ NO If yes, complete the following:			
Monitoring Equipment	**Monitoring Frequency**	**Action Level**	**Required Action**
Particulate Monitor (Utilized to monitor dust generated by excavation activities to evaluate potential exposure to lead and copper)	Continuously during performance of excavation activities	0 to 2.5 mg/m3	Modified Level D PPE (long pants, long-sleeve shirts, eye protection, gloves, and hard hat)
		2.5 to 5 mg/m3	Stop work; engineering controls
		5 mg/m3 > or greater	Stop work; upgrade PPE

TASK – Excavation and Conductive Flooring Removal Activities Is exposure monitoring required for the completion of this project? ☒ **YES** ☐ **NO If yes, complete the following:**			
Monitoring Equipment	**Monitoring Frequency**	**Action Level**	**Required Action**
Fibrous Aerosol Monitor (FAM) And Personal air monitoring pumps and membrane air filters.	Continuously during performance of asbestos abatement activities	0 to 0.01 f/cc (TWA-8hr)	Modified Level D PPE (long pants, long-sleeve shirts, eye protection, gloves, and hard hat)
		0.01 to 0.1f/cc (TWA-8hr)	Level C PPE with full-face respirators with GME Super Cartridge/P100 Filter) Continuous air monitoring with the FAM Air samples should be collected upwind and downwind of work area; personal monitoring for asbestos for workers with potential exposure

		0.1 to 1 f/cc (TWA-8hr)	Stop work; Level C PPE (full-face respirators with GME Super Cartridge/P100 Filter) Evaluate impact to community before restarting the work.
		> 1 f/cc (TWA-8hr)	Stop work; upgrade to Level B PPE – full face with PAPR respirators) Evaluate impact to community before restarting the work.

j. Hazard Communication Program

All project required chemicals must be handled in accordance with OSHA 29 CFR 1910.1200, ARCADIS-HazCom Procedure (ARC HSGE007), and the requirements outlined in the Field H&S Handbook. Copies of the MSDSs for any chemicals utilized during performance of the work will be maintained on-site and available for review. The proper use of any work related chemicals, and the potential risks associated with their use, will be reviewed each day as part of the daily tailgate health and safety meetings.

k. Asbestos Abatement Plan

ARCADIS will utilize the subcontract services of a qualified asbestos abatement contractor (Winter Environmental) licensed in the Commonwealth of Virginia to perform the required soil excavation and conductive flooring removal activities at the BLA and IAA sites. The asbestos abatement contractor was selected following a competitive bid process that will include a minimum of three pre-qualified bidders. The Contractor will be responsible for performing the required conductive flooring material removal, soil excavation, and related activities as outlined in the following sections. A licensed asbestos abatement contractor is required to perform this work due to the presence of asbestos in both the conductive flooring and soil at the BLA and IAA. Further details on the health and safety components of the asbestos abatement activities are discussed in Section 11.m. Technical Specifications for the asbestos abatement activities are also presented in Appendix C of the RAWP for the BLA and IAA Removal action.

l. Lead Abatement Plan

Lead is one of the COCs that has been identified in the conductive flooring and soil that are the target of the remedial actions at the BLA and IAA. Asbestos has also been identified in the areas where the lead cleanup actions will take place. The respiratory protection measures that have been put in place for asbestos (e.g., protective coveralls and full-face respirators with HEPA filters) are also protective of lead; therefore additional protective measures will not be required. However, site workers will be notified of the lead hazard via site meetings and signage. Furthermore, eating, drinking and smoking will not be permitted in the work areas and workers will be required to wash their hands when leaving the work areas. A copy of ARCADIS Lead Health and Safety Prolicy is included in Attachment 10

m. Demolition Plan (Conductive Floor Removal)

The conductive flooring removal activities will be performed by Winter Environmental following completion of the preliminary site clearing activities. The conductive flooring material is a known asbestos containing material and must be performed according to strict asbestos abatement guidelines. Only properly trained asbestos abatement workers, supervisors, and project monitors will be permitted to access the asbestos abatement enclosures and regulated areas in which the conductive flooring removal activities will be performed until the work area has been certified clean. The following sections discuss the activities that will be conducted for the conductive flooring removal actions at the BLA and IAA.

1) Warning Signs and Tape

Warning signs and tape printed bilingually in English and Spanish shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 20 by 14 inches, and displaying the following legend in the lower panel:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

2) Isolation of Removal Work Areas

Due to the presence of friable asbestos materials and lead, the conductive flooring abatement work areas will be isolated by the construction of a temporary plastic enclosure that will be maintained under negative pressure with the use of air filtration units equipped with High Efficiency Particulate Air (HEPA) filtration. Isolation of work area will be conducted in conformance with Technical Specification 01070 – Asbestos Containing Material Abatement and Disposal provided in Appendix C of the Remedial Action Work Plan.

Prior to performance of the flooring removal activities, ARCADIS asbestos abatement project monitors will visually inspect each work area enclosure to document that they have been properly constructed and are functioning properly in accordance with the specifications and applicable regulations.

3) Flooring Removal Procedure

Following approval of the work area enclosures, the Contractor will remove the conductive flooring using wet methods and prompt clean up. The wet methods will minimize the potential for asbestos fibers to become airborne during the removal action. While the exact methods and procedures for removing the conductive flooring material will be determined by the Contractor, the flooring removal activities will include an initial removal of loose/easily recoverable materials and debris, followed by a subsequent fine cleaning of the underlying concrete to remove any residual materials. All intact and degraded conductive flooring materials located in the 7 former buildings at the BLA and the 29 former buildings at the IAA will be removed during this action. Removal of conductive flooring shall be conducted in accordance with federal, state, local regulations and in accordance with Technical Specification 01070 – Asbestos Containing Material Abatement and Disposal provided in the Remedial Action Work Plan. Only the subcontractor's (Winter Environmental) trained asbestos abatement workers and ARCADIS asbestos abatement project monitors will be permitted in the asbestos work area enclosures during the removal activities.

4) Flooring Waste Temporary Storage, Transportation, and Disposal

All conductive flooring and waste materials generated during the flooring removal action will be stored inside two separate asbestos-specific waste storage bags. This

waste will be temporarily staged inside the contained work area or in a secured trailer or temporary storage facility until prepared for transport to the off-site disposal facility. Due to the presence of friable asbestos, the material will be disposed of at licensed asbestos disposal facility. All waste shall be placed in OSHA-approved six-mil thick plastic waste bags designed for the specific use of asbestos waste disposal. The waste will be maintained adequately wet and double-bagged. Refer to Specification Section 01070 provided in the Remedial Action Work Plan for details.

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

5) Work Area and Ambient Air Sampling

Prior to performance of the flooring and soil removal activities, ARCADIS will collect pre-abatement air samples to document prevalent airborne asbestos fiber concentrations for comparison to air samples collected during the abatement and excavation activities as well as final clearance air samples.

During performance of the flooring removal activities, ARCADIS will collect air samples at each work area to document the presence or absence of airborne asbestos fibers outside and inside the work area enclosures. If necessary, the air samples will be compared to the pre-abatement air sample results to determine if a fiber release has occurred related to the contractor's work.

Each of the air samples will be collected and analyzed by the National Institute of Occupational Safety and Health (NIOSH) 7400 Method, Phase Contrast Microscopy (PCM). This method does not differentiate between asbestos and non-asbestos fibers. If necessary, PCM air samples may be reanalyzed by Transmission Electron Microscopy (TEM) which has a higher resolution and can differentiate between asbestos and non-asbestos fibers.

All air sampling shall be performed by ARCADIS' properly trained and licensed asbestos abatement project monitors.

6) Personnel Air Monitoring

Personnel exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed by the ARCADIS project monitor, at the direction of the Contractor's Competent Person, in accordance with 29 CFR 1926, Section .1101, and as specified. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. The ARCADIS project monitors will be qualified analysts and have the appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926.1101, to include NIOSH Pub No. 84-100 Method 7400.

Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be determined by the Contractor's Competent Person. The Competent Person will then direct ARCADIS as to which employees and work activities to conduct the personal exposure monitoring so that they are in compliance with the OSHA standard.

The personnel exposure monitoring samples shall be collected using low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to between 1 – 2.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands, are to be used with low flow pumps in accordance with 29 CFR 1926, Section .1101 for personal air sampling.

Results of breathing zone samples shall be posted at the job site and made available to the Contractor and ARCADIS. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with ARCADIS to determine the cause. At the discretion of ARCADIS, fiber concentration

may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify ARCADIS, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by ARCADIS.

7) Confirmation Sampling Program

The sampling activities presented in Section 4.4.5 of the Remedial Action Work Plan shall be conducted in accordance with Technical Specification 01070 – Asbestos Containing Material Abatement and Disposal.

8) Final Visual Inspection

To document that the conductive flooring material is successfully removed from BLA and IAA buildings, each flooring removal work area will be visually inspected by the ARCADIS project monitor in general accordance with ASTM E1368. The visual inspection will determine the presence of visible remaining flooring material, dust, and/or debris. If flooring material, dust or debris are observed, the contractor shall re-clean those areas until no visible flooring material, dust, or debris are observed. Once the visual inspection passes, ARCADIS will document this event and initiate final clearance air sampling.

9) Final Clearance Air Sampling

Prior to dismantling the temporary flooring removal area enclosures, ARCADIS will collect a representative number of final clearance air samples to determine the airborne fiber concentrations inside the contained work areas. If each of the final clearance air samples measure equal to or less than 0.01 fibers per cubic centimeter of air (f/cc), then the contained work area will be released for dismantling. If any one of the final clearance air samples measure above 0.01 f/cc, ARCADIS will determine if the air sample should be re-analyzed by Transmission Electron Microscopy (TEM) which has the capability to differentiate asbestos fibers from non-asbestos fibers. However, ARCADIS may also elect to have the contractor re-clean the containment and re-collect the final clearance air samples.

n. Abrasive Blasting

Blast cleaning operations are not anticipated for the required work at the BLA and IAA project sites. However, in the event that abrasive blasting is required, blast cleaning enclosures shall be exhaust ventilated in such a way that a continuous inward flow of air will be maintained at all openings in the enclosure during the blasting operation. Prior to performance of the blasting activities, ARCADIS will visually inspect each work area enclosure to document that they have been properly constructed and are functioning properly in accordance with the specifications and applicable regulations.

o. Excavation/Trenching Plan

The remediation activities for soil at the BLA and IAA will be performed upon completion of the conductive flooring removal activities. The remediation activities for soil will include the excavation and off-site disposal of soils located immediately adjacent) to the buildings with conductive flooring, and generally within 2-ft of the building sides. The depth of the excavation will not exceed 1 ft below ground surface. Site maps depicting the excavation areas are presented in the RAWP for the BLA and IAA. The target COCs for the excavation activities are asbestos, copper, lead, and Aroclor 1254. Because asbestos is known to be present in soil, the excavation work will require site workers to wear respirators while excavation activities are on-going in the regulated area. Respirators will not be required when there are no on-going dust generating activities. A copy of ARCADIS' excavation and trenching health and safety procedures is included as Attachment 11. The following sections outline the details of the planned excavation activities.

1) Isolation of Soil Excavation Work Areas

ARCADIS and the Contractor will erect OSHA-approved asbestos warning barrier tape surrounding the excavation work areas to restrict access. A decontamination chamber for site workers may be constructed immediately adjacent to the isolated work area or it may be constructed a short distance away as a remote decontamination chamber that will be used for several work areas.

ARCADIS will visually inspect each excavation work area prior to performance of the required excavation activities to document that they have been properly isolated in accordance with the specifications and applicable regulations.

2) Soil Excavation Removal Procedures

The planned depth of the excavation activities at the BLA and IAA sites is 1 ft bgs. The final horizontal and vertical limits will be determined in the field through visual observation of soils (for flooring related impacts) and the confirmation sampling program.

The bulk of the excavation work will be performed using conventional mechanical earth moving equipment. However, hand digging may be required immediately adjacent to some of the buildings to ensure complete removal of the target soils. If possible, the tracks of the excavation equipment will stay outside the footprint of the excavation areas and/or truck loading area to minimize the potential transport of impacted soils from the work areas.

In order to minimize handling of impacted material, the excavated soil will be direct loaded onto dump trailers or roll-offs when possible for transport to the off-site disposal facility. If necessary to expedite the pace of work, small piles of soil may be temporarily staged within or adjacent to the footprint of the excavations; however, the staged materials shall not exceed the volume of one dump trailer load. Any stockpiles that are formed will be placed on 10 ml polyethylene tarps to prevent re-contaminatiion of the previously excavated areas. Temporarily staged soil piles awaiting disposal shall be kept wet and covered with plastic sheeting to prevent dust and/or asbestos releases.

3) Dust and Asbestos Control

The contractor will use water as a primary engineering control to reduce fugitive airborne dust and asbestos fiber emissions prior to and during the excavation activities. Water will also be utilized to prevent emissions from temporary soil staging areas. Water for dust and asbestos control will be obtained from clean (potable) sources.

4) Temporary Storage, Transportation, and Disposal of Soil and Waste Materials

When possible soils designated for off-site disposal will be placed directly into dump trailers or roll-off containers. Once a truck is fully loaded, the soil load will be re-wetted to prevent dust and asbestos emissions. The soil will then be covered with polyethylene-coated tarps or other suitable covers that are properly secured for

transport. Trucks shall be inspected and loose soil on the exterior of the truck will be removed prior to leaving the truck loading area.

A vehicle log denoting when each truck has entered and left the site will be maintained and will include each truck's identification number, driver identification, the times of arrival and departure, and the approximate volume of material hauled. The soil will then be transported by Capitol Environmental, Inc., to an Alliant Tech Systems, Inc. (ATK) approved, fully-permitted Subtitle D disposal facility (Michigan Disposal). A representative from RFAAP will review, approve, and sign waste profiles and manifests prior to the disposal of soil from the site.

Transportation of the impacted soil will be conducted in accordance with the applicable regulations, including the requirements of the DOT and Technical Specification 02250 – Transportation and Disposal (Appendix C). Materials transporters will be appropriately licensed, permitted, and in compliance with all applicable regulations. The waste disposal contractor will submit copies of all manifests to the ARCADIS representative. Copies of the final waste manifests and weigh tickets will also be provided to ARCADIS upon receipt of the material at the disposal facility

Waste materials (e.g. PPE) generated during performance of the excavation activities will be placed in OSHA-approved asbestos waste storage containers. This waste will be moved and stored in a secured trailer or temporary storage facility until transported off site for disposal.

5) Work Area Air Sampling

Prior to excavation activities, ARCADIS will collect pre-abatement air samples to document prevalent airborne fiber concentrations for comparison to air samples collected during abatement and excavation activities as well as final clearance air samples.

ARCADIS will collect air samples at each work area during the excavation activities to document the presence or absence of airborne fibers outside and inside the work areas. If necessary, the air samples will be compared to the pre-abatement air sample results to determine if a fiber release is or has occurred related to the contractor's work.

Each of the air samples will be collected and analyzed by the National Institute of Occupational Safety and Health (NIOSH) 7400 Method, Phase Contrast Microscopy (PCM). This method does not differentiate between asbestos and non-asbestos fibers.

If necessary, PCM air samples may be reanalyzed by Transmission Electron Microscopy (TEM) which has a higher resolution and can differentiate between asbestos and non-asbestos fibers.

The air samples for the soil excavation work areas will be collected in upwind and downwind locations relative to the excavation work area using high-volume sampling pumps that can be calibrated and operated at constant air flow up to 16 liters per minute. The samples will be collected on a single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands.

In addition to monitoring airborne asbestos concentrations, ARCADIS will monitor airborne dust concentrations at concentrations upwind and downwind of the excavation area using a real-time particulate monitor. In the event that the excavation activities create dust levels above background conditions or the Action Levels, water will be added to the excavation area to control dust generation.

6) Personnel Exposure Monitoring

Personnel exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed by the ARCADIS project monitor, at the direction of the Contractor's Competent Person, in accordance with 29 CFR 1926, Section .1101, and as specified. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. The ARCADIS project monitors will be qualified analysts and have the appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926.1101, to include NIOSH Pub No. 84-100 Method 7400.

Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be determined by the Contractor's Competent Person. The Competent Person will then direct ARCADIS as to which employees and work activities to conduct the personal exposure monitoring so that they are in compliance with the OSHA standard.

The personnel exposure monitoring samples shall be collected using low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to between 1 – 2.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack

capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands, are to be used with low flow pumps in accordance with 29 CFR 1926, Section .1101 for personal air sampling.

Results of breathing zone samples shall be posted at the job site and made available to the Contractor and ARCADIS. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with ARCADIS to determine the cause. At the discretion of ARCADIS, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify ARCADIS, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by ARCADIS.

7) Soil Confirmation Sampling Program

ARCADIS will collect soil samples from the perimeter and base of the excavated areas to verify that the response actions successfully encompassed the soils where COCs were present at concentrations above the applicable RALs. The samples collected around the BLA and IAA buildings will be field screened for copper and lead using a NITON Model XLT792 XRF analyzer, or equivalent. Because asbestos is assumed to be co-located with copper and lead; the field screening results for copper and lead will be used as a surrogate indicator for asbestos. Approximately 10% of the field samples will be submitted for laboratory analysis of lead and copper by USEPA Method 6010 and asbestos by transmission electron microscopy via USEPA method 600/R-93/116 with sample preparation using California Air Resource Board (CARB) Method 435. The laboratory results will be used to confirm the XRF field screening results and the success of the removal action. The laboratory samples will be analyzed on a 24 hour turn-around time.

Aroclor 1254 was identified as a target COC for soils in certain areas of the IAA (i.e., former transformer location near Building 8101 and near former Buildings 502 and 504). Therefore the confirmation soil samples collected in these areas will also be submitted for laboratory analysis of Aroclor 1254 by USEPA Method 8082B.

In the event that the field screening or laboratory analytical results indicate that COCs are present at concentrations above the RALs that have been established for the BLA and IAA sites, the excavations will be expanded as follows:

i. For excavation perimeter samples that exceed the target RALs, the excavation will be expanded a distance of two feet, perpendicular to the sidewall of the excavation. The lateral extent of the excavation expansion shall extend from the exceeding sample location to the mid-way point between the next compliant sample location.

ii. For excavation base samples that exceed the target RALs, the depth of the excavation will be expanded by 6 inches at the corresponding sample location. The lateral extent of the excavation expansion shall extend from the exceeding sample location to the mid-way point between the next compliant sample location.

iii. The excavation expansions will be terminated when the results of the confirmation sampling program indicate COC concentrations at each of the sample locations are less than the applicable RALs.

8.) Backfill

Once the final vertical and horizontal excavation limits have been achieved, the areas at the BLA and IAA that have been excavated shall be backfilled utilizing clean imported fill. Common borrow soil shall be placed in loose 1 ft loose lifts and be compacted to a visually acceptable standard using standard construction equipment. Common borrow shall be placed up to 0.5 ft bgs, with the remaining 0.5 ft of fill consisting of topsoil suitable for the establishment of a vegetative layer. The final grade of the Site shall be constructed so that it promotes positive drainage and does not create erosional features.

p. Hazardous Energy Control Plan

Lockout/Tagout procedure will be followed if required during remedial activities.

q. Site-Specific Fall Protection & Prevention Plan

Workers may be exposed to fall hazards during conductive flooring removal activities due the presence of elevated work surfaces on some of the former buildings. Fall protection will be utilized for all areas where the possibility exists for a worker to fall more than 6 vertical feet. Guard rails and warning signs shall be erected on all elevated building surfaces to protect workers from fall hazards. Personal fall arrest systems will be used while performing work on scaffolds; formwork; elevated man-lifts, and steel erection. Each worker who might be exposed to fall hazards from heights and using fall protection equipment shall be trained by a competent person for fall protection. Fall protection equipment will be inspected prior to each use to determine that it is in a safe working condition. Defective or damaged equipment will be removed from service immediately and replaced. Workers will perform TRACK to recognize specific fall hazards.

r. Confined Space Program

Confined space work will not be permitted as part of the planned scope of acrtivities at RFAAP-NRU. .

12. Risk Management Processes

ARCADIS utilizes a Loss Prevention System based health and safety program to identify and minimize the potential risks associated with performing activities. Job-Loss Analyses (JLAs) are a important component of this system. The Site Specific JLAs that have been prepared for the work at the BLA and IAA project sites are provided in Attachment 2 of this APP.

Attachment 1

Primary Health Hazards

Bag Loading Area and Igniter Assembly Area Remedial Action New River Unit (RAAP-044)

Primary Health Hazards

The five primary constituents of concern (COCs) at the Radford Bag Loading Area (BLA) and Igniter Assembly Area (IAA) are **copper, lead, asbestos, Aroclor 1254, and benzo(a)pyrene** in surface soil. The presence of these four COCs in surface soil is the driver for the removal action being conducted at the site.

The following table provides chemical hazard information for the identified COCs.

Substance	Routes of Entry	Symptoms of Exposure	Treatment	8-hrTWA	IDLH (NIOSH)
Copper	Inhalation Ingestion	Irritates nose and eyes	Remove to fresh air if inhaled; flush eyes with water	1 mg/m^3	100 mg/m^3
Lead	Inhalation Ingestion	Irritates skin and eyes, hypotension, weakness, anemia, kidney disease	Remove to fresh air if inhaled; flush eyes and skin with water	0.05 mg/m^3	100 mg/m^3
Asbestos	Inhalation, Ingestion, Skin/Eye Contact.	Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation to the eyes; [potential occupational carcinogen].	Remove to fresh air if inhaled; flush eyes and skin with water	0.1 $fiber/cm^3$	NA
Aroclor 1254	Inhalation Ingestion	Irritates nose and eyes	Remove to fresh air if inhaled; flush eyes with water	0.5 mg/m^3	5 mg/m^3
Benzo(a)pyrene	Inhalation Ingestion	Irritates eyes and skin, and possible carcinogen	Remove to fresh air if inhaled; flush eyes and skin with water	0.2 mg/m^3	80 mg/m^3

Precautions to minimize exposure:

- PPE including safety glasses, boots, long pants, long sleeve shirts, gloves to be worn while on-site to minimize dermal contact. Tyvek suits will be required as well to minimize soil contact with clothing.

- No eating or drinking while in the work zones. Wash hands with soap and water prior to eating or drinking off-site.

- Dust monitor and fibrous air monitoring will be utilized to evaluate particulates in breathing air. If necessary, the excavation will be watered to minimize dust generation. Respirators with GME super cartridges will be worn during the excavation activities.

Attachment 2

Job Loss Analyses

The following Job Loss Analysis (JLA)/ Health and Safety Procedures are provided in this Appendix:

1. Air Monitoring
2. Asbestos
3. Decontamination of Large Equipment
4. Decontamination of Small Equipment
5. Driving
6. Excavation Activities
7. Heavy Equipment Operation
8. Ladders
9. Man Lift Operations
10. Scaffolding
11. Silt Fence Installation
12. Site Clearing
13. Sample Cooler Handling
14. Surface Soil Sampling

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3347
Job Name	Environmental-Air Monitoring
Task Description	Air Monitoring
Project Number	GP08RAAP4BLA
Project Name	RAAP-044 BLA RESPONSE ACTION
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(2) Review
Creation Date	8/27/2010 04:12:02 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active
HASP Reviewer	Webster, Charles	9/10/2010			Insco, Ashly	True
Reviewer	Wisbeck, Diane	9/10/2010			Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Mobilization/Demobilization	1	Lifting equipment	Utilize appropriate lifting techniques. Team lift object heavier than 50 lbs. Utilize material handling equipment whenever possible.	
		2	Abrassions	Use work gloves when handling equipment and supplies.	
		3	Motor vehicle accident	Use Smith System defensive driving techniques.	
2	Tailgate Safety Meeting	1	N/A	Conduct a tailgate safety briefing each day prior to the start of work and if job site and/or conditions change during the day. Review appropriate sections of the Field Safety & Health Handbook. Ensure that all employees are fully aware of all hazards and are wearing all necessary PPE. Ensure all employees are aware of the locations of emergency equipment and contacts.	ARCHSGE001

3	General Environmental Conditions	1	Heat Stress	a. Dress appropriately for the weather. b. Take frequent breaks as necessary to cool off/warm up. c. Stay hydrated by drinking plenty of water. d. Stay out of direct sunlight when possible.	
		2	Severe weather	a. Monitor the weather forecsase for each day's activities. b. Take immediate shelter in a protected structure or field vehicle in the event of lightning, hail, high winds, or flooding.	
		3	Bites/Stings - Insects/Spiders/Snakes	a. Wear insect repellant during outdoor activities. b. Avoid disturbing area that may be a habitat for insects, spiders, or snakes. Use caution when moving rocks, equipment, or other items that may be providing shelter for these animals. c. Wear sturdy boots to protect from snake bites.	
		4	Heavy equipment operation in vicinity	a. Establish clearly marked work areas using barrier tape, cones, or other highly visible material. b. Wear safety vests when working in areas within 200 ft of heavy equipment operation. c. Notify the site contact of the work area.	
		5	Uneven terrain or overhead hazards	a. Survey the working area prior to set up. Mark any holes, pits, or other hazardous terrain. Note any possible overhead hazards prior to monitoring near construction activities. b. Wear sturdy safety shoes.	
4	Equipment/Site Set Up	1	Materials handling/heavy lifting	Utilize appropriate lifting techniques. Team lift objects over 50 lbs. Utilize materials handling equipment whenever possible.	
		2	Falls from height	a. When operating the scissor lift personnel must stay within in the confines of the lift railing. b. Utilize personal fall arrest equipment when exposed to unprotected falls from greater than 4 feet.	
		3	Scissor lift operation	a. Only trained personnel may operate the scissor lift. b. Personnel may not ride on the lift while extended.	

		4	Electricity	a. Inspect all extension cords prior to use. Mark all damaged cords out of service. b. Protect cords in use from traffic or other damage. c. Ensure cords are appropriate for the load.	
5	Monitoring/Data Collection	1	COC exposure	a) use respiratory protection and specified PPE when working in the regulated area	
		2	Heat stress/Sunburn/Cold Stress	Wear appropriate clothing for conditionsl	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Respiratory Protection	Full Face Respirator with HEPA filter		Required
Hand Protection	work gloves (specify type)	leather or cotton	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	first aid kit		Required
Miscellaneous	Other	Safety/Traffic Vest	Required
Personal	insect repellant		Required
Personal	sunscreen		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	4205
Job Name	Construction-Oversight - excavation and construction
Task Description	Conductive Flooring Removal
Project Number	GP08RAAP4IAA
Project Name	RAAP IAA RESPONSE ACTION
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(4) Revise
Creation Date	12/19/2010 4:46:49 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Kalinowski, Christopher	1/2/2011			Bertz, Charles	True
Developer (Primary Contact)	Kalinowski, Christopher	1/2/2011			Bertz, Charles	True
HASP Reviewer	Webster, Charles				Insco, Ashly	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Put on PPE and prepare to enter work area	1	Contaminant Exposure during performance of the work.	Inspect PPE to make sure it is in proper working order and applied properly.	
2	Equipment Set up in work area	1	slip/trip/fall	Keep close eye on footing and make sure area is properly policed.	
3	Remove Flooring and Place in containment bags.	1	materials handling/heavy lifting.	Utilize appropriate lifting techniques including team lifts where objects weigh over 50 lbs.	
		2	Back strain	Use proper body positioning for work. Do not bend over excessively.	
		3	Exposure to COCs	r r r r d d r d r r r d	
		4	Falls from height	dd r r d r dr d r d r d r d r	
		5	Falling debris	M r r d r d rd r r r r r d d r d r r r r d r d d r	
		6	sharp edges	r r r d r r d r r d r r d rd	
4	Decontaminate PPE and equipment	1	Exposure to COCs	d r d r r r r r	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	chemical protective suit (specify type)	Tyvek	Required
Dermal Protection	coveralls		Required
Eye Protection	safety goggles	or Full-face respirator	Required
Foot Protection	boots		Required
Foot Protection	outer boot covers		Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)	nitrile inner gloves, leather outer golves	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone	kept on-site but not in regulated area.	Required
Decontamination	Decon supplies (specify type)	heated decon shower unit.	Required
Miscellaneous	fall protection (specify type)	barriers and fall arrestors	Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Miscellaneous	Other	full face respirator with HEPA filter cartridege	Required
Personal	eye wash (specify type)		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3361
Job Name	Environmental-Other
Task Description	Environmental - Decontamination of Large Equipment
Project Number	GP08RAAP0044
Project Name	AEC/ RAAP-044
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(2) Review
Creation Date	8/30/2010 1:50:34 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles	9/13/2010			Insco, Ashly	True
Reviewer	Wisbeck, Diane	9/13/2010			Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Decontamination procedures will be implemented for all non-disposal equipment (e.g., macro core sampleer, hand trowels, splitsppons, etc.)	1	Inhalation and absorption of decon fluids, slips/trips/falls, hand/eye/foot injuries (cuts), lifting hazards	Utilize appropriate PPE. Handle equipment carefully. Use proper decontamination techniques as per the sampling task (surface soil sampling). Use squirt bottles instead of spray bottles to eliminate mists from solvents. Use caution if walking on wet plastic sheeting and establish decontamination boundaries to keep unauthorize personnel away from area.	
2	Decontamination of large equipment and vehicles	1	Inhalation and absorption of was fluids, slip/trip/falls, injuries, and lifting hazards (strains)	Utilize appropriate PPE with splash shield. Handle equipment carefully. Use proper decontamination techniques as per the sampling task. Caution using high pressure washing equipment and steam cleaners with the hot surfaces and water jet blast of sprayer. Check decon area for uneven surfaces and keep eye contact with drivers when moving vehicles in and out of the decon pad. Use caution if walking on wet plastic sheeting and establish decontamination boundaries to keep unauthorized personnel away from area.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Dermal Protection	splash apron		Recommended
Eye Protection	faceshield		Required
Foot Protection	boots		Required
Hand Protection	chemical resistant gloves (specify type)	nitrile	Required
Head Protection	hard hat		Required
Miscellaneous PPE	traffic vest--Class II or III		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)		Required
Personal	insect repellant		Required
Personal	sunscreen		Required
Personal	water/fluid replacement		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3360
Job Name	Environmental-Other
Task Description	Decontamination of Small Sampling Equipment
Project Number	GP08RAAP0044
Project Name	AEC/ RAAP-044
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(2) Review
Creation Date	8/30/2010 1:30:16 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles	9/13/2010			Insco, Ashly	True
Reviewer	Wisbeck, Diane	9/13/2010			Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Prepare decontamination area	1	Selection of appropriate decontamination area; site hazards; back strains; slips, trips, and falls	Situate decontamination area in a location designated by the site supervisor; check the decontamination area for uneven surfaces. Utilize appropriate PPE including work boots and leather work gloves.	
2	Decontamination of small, non-disposable, sampling equipment (e.g., parastaltic pump, YSI, submersible pump, turbidity meter, hand auger, trowels, etc.)	1	Ingestion, inhalation, and absorption of decontamination fluids; slips, trips, and falls; hand, eye and foot injuries (cuts); lifting hazards; sprains and strains	Perform decontamination activities in an area designed to prevent spillage or leakage of decontamination fluids. Utilize appropriate PPE. Handle equipment carefully using correct bending and lifting techniques. Use proper decontamination techniques as per the sampling task. Use caution if walking on wet plastic sheeting. Establish decontamination boundaries to keep unauthorixed personnel away from area.	
3	Collection of decontamination fluids	1	Spillage of decontamination fluids	Utilize mitrile gloves. Handle equipment and containers carefully. Material Safety Data Sheets, absorbent materials, an eye wash bottle, and a first aid kit will be available.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Hand Protection	chemical resistant gloves (specify type)	nitrile gloves	Required
Head Protection	hard hat		Required
Miscellaneous PPE	traffic vest--Class II or III		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	DI water and alconox	Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)		Required
Personal	insect repellant		Required
Personal	sunscreen		Required

Job Loss Analysis

General

Client Name	ARCADIS-AGMI
JSA ID	15
Job Name	General Industry-Driving - passenger vehicles
Task Description	Driving Passenger Vehicle or Pick Up Truck
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC Name	
Project Manager	NO PROJECT MANAGER
Status	(3) Completed
Creation Date	1/29/2009 2:10:18 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Coppola, Mija	1/31/2009	1/29/2009	True	Coates, Gary	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Coppola, Mija	Approve	01/29/2009	

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Preforming Pre-trip inspections	1	Cuts scrapes to hands and fingers checking engine fluids	Use TRACK to plan inspection activity in the engine compartment. Wear protective gloves if reaching in poorly illuminated areas of the engine.	
		2	Pinch crush hazards to hands and fingers checking engine fluids or closing doors.	Identify and keep hands fingers away from pinch hazards from doors and vehicle hood or tailgate (if present).	
		3	Awkward body positions checking tires, spare tire, undercarriage, or engine compartment.	Maintain neutral body positions and avoid awkward reaches under the vehicle or in engine compartment.	
		4	Failure to inspect vehicle emergency equipment may result in extensive vehicle damage or delay treatment in the event of injury	Conduct equipment inspections by visibly inspecting fire extinguisher and first aid kit for cleanliness, in date items/tags, readiness for use.	
2	Vehicle loading and unloading	1	Object placement obstructing rear, side or blindspot view	Avoid placing objects in a manner that obstructs your view, brake equipment down to a smaller more manageable size to keep low profile in vehicle. If hanging clothes in vehicle, place in manner that does not obstruct blind spots.	

2	Vehicle loading and unloading	2	Unsecure objects causing pedal, steering or gear shift obstruction or injury during vehicle operation.	Secure all loads in vehicle (both in the bed of trucks and in passenger cabin) to prevent unanticipated movement or shifting that could injure driver, passenger, or affect safe operation of vehicle.	
		3	Obstuction of vehicle safety equipment caused by object placment in vehicle.	Keep emergency equipment clear and unobstructed to ensure ready availablity.	
3	Vehicle operation	1	Failure to use Smith System "5-Keys" increases risk of accident and injruy.	Use Smith System "5-Keys", maintain space cushion around vehicle, maintain 4 second rule and add (second for each addtional hazard (wet roads, snow, etc). Brake gradual, keep eyes moving, check mirrors every 6-8 seconds, use turn signals, focus on relavent objects, use early lane positioning when approaching turns.	
		2	Injury or death from failure to wear seatbelt	Always wear seatbelts even if driving short distances off of a public roadway.	
		3	Cell phone use increases risk of accidnt and injury	Avoid using cell phones in any capacity when operating a vehicle, check client for cell use on project sites and follow requirements. Follow all local laws.	
		4	Use of radar detectors encourages speeding resulting in increased risk for accident or injury	Use of radar detectors and similar devices is prohibited.	
4	Routine maintenance	1	Pinch crush hazards to hands and fingers replacing engine fluids or closing doors/hood.	Inspect and indetify pinch and crush hazards and keep hands/fingers clear when closing hood, tailgates, or doors.	
		2	Burn hazards to hand form checking/replacing fluids in engine compartment	When practical allow engine to cool prior to servicing or adding fluids. Use protective gloves.	
		3	Vehicle damage from improper fuse replacement	Never replace a fuse with a higher amperage than the one being replaced. Only replace fuses of type being replaced.	
		4	Failing to use Wright Express for vehicles equipped with fuel card impairs maintenace tracking that could affect vehicle safety	If vehicle is assigned a Wright Express Card, use the card so accurate maintenance tracking can be performed by LeasePlan.	

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Traffic Control	Other	Roadway emergency kit	Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3341
Job Name	Construction-Excavation and trenching
Task Description	Excavation activities
Project Number	GP08RAAP0044
Project Name	AEC/ RAAP-044
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(3) Completed
Creation Date	8/27/2010 01:41:03 PM
Auto Closed	False

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Site preparation	1	Improper utility clearance may result in utility/equipment damage or injury.	Perform utility clearance with a minimum of 3 lines of evidence. documetn utiltiuy clearance for reference including any ticket numbers or phone numbers of utilities.	
		2	Clearing vegetation may result in impact hazards.	Stand at least 25 ft fromclearing operations using manual or mechanized methods. Larger vegetation like trees may be under stress and may break and wood parts my fly in any direction	
		3	Slip trip and fall hazards from walkover activites (vegetation, uneven surfaces, etc and applies to all job steps in this JLA)	Plan route and focus on the task at hand (walking). do not walk while looking at utilty maps/drawings or talking on cell phones.	
2	Excavation and backfilling	1	Struck by excavation equipment during excavation	Stay at least 10 beyond the reach of excavation equipment unless establishing communication with operator. wear PPE required by this JLA for increased visibility. Keep unneccessary workers way from excavation area.	
		2	Equipment/worker falls into excavations from edge collapse	Stand at least 6 ft from edge of excavation. Competent person to oversee sloping, benching, bracing excavation to ensure stability.	

		3	Worker entrapment/suffocation/chemical overexposure/engulfment in excavation	Entry into excavations are prohibited unless approved by a Competent Person. Keep spoil piles at least 2 ft from excavation edge. Ensure proper slope/bench/shileding is in place prior to entry. Air monitor for toxic vapors and oxygen deficiency. Ensure proper means of access and egress.	
		4	Chemical exposure to site contaminants.	Wear protective clothing specific in this JLA, avoid skin contact with soil materials or any liquids in the excavation. Use air monitoring to ensure TLVs are not exceeded. Use water to wet soils to prevent dust generation. Wash hands and face prior to eating, drinking or consuming tobacco.	
		5	Noise from excavation equipment	Keep distance from equipment to reduce noise levels. If levels cannot be controlled wear hearing protection appropriate for the hazard.	
3	Excavation equipment decontamination	1	Slips and falls on wet surfaces.	Wear footwear appropriate for wet environments. Reduce amount of pressure washing required by removing soils using dry methods to extent practical	
		2	Flying particles from cleaning activities.	Wear eye and skin protection during decontmination activities. use face shield of overspray or flying debris is a persisitent problem. Avoid cleaning (pressure washing) in direction of other nearby workers, keep uneccessary workers clear of decontmination activity.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	chemical protective suit (specify type)	Tyvek per SSO	Required
Eye Protection	faceshield	During decontamination (per SSO)	Required
Eye Protection	safety glasses		Required
Foot Protection	rubber boots	Wet environments per SSO	Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile when handling impacted soils	Required
Hand Protection	work gloves (specify type)	leather or equivalent (per SSO)	Required
Head Protection	hard hat		Required
Respiratory Protection	full face respirator with HEPA filter		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III	Class II	Required

Supplies

Type	Supply	Description	Required

Communication Devices	mobile phone		Required
Communication Devices	walkie talkie	per SSO	Required
Miscellaneous	auxilary lighting	Light plant for night work	Required
Miscellaneous	fire extinguisher	ABC 10 pound minimum	Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)	Bottle	Required
Personal	insect repellant		Recommended
Personal	sunscreen		Recommended

Job Loss Analysis

General

Client Name	ARCADIS-AGMI
JSA ID	344
Job Name	Construction-Heavy equipment operation
Task Description	heavy equipment operations
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC Name	
Project Manager	NO PROJECT MANAGER
Status	(3) Completed
Creation Date	5/29/2009 10:13:13 AM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Moyers, Samuel	6/12/2009	6/15/2009	True	Coppola, Mija	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Moyers, Samuel	Approve	06/15/2009	

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Loading and Unloading Equipment from transport vehicles.	1	Stake or impact hazards from moving equipment	Stand clear of equipment loading or unloading form transport vehicles	FHSHB Section IV (E); ARCHSF019, FHSHB Section III (MM)
		2	Equipment damage from improper removal or placement on vehicle	Ensure any ramps used are rated for weight and properly placed and secure prior to moving equipment across, ensure trailers being loaded or unloaded are properly secured against movement.	FHSHB Section IV (E); ARCHSF019, FHSHB Section III (MM)
		3	Overhead utility contact for equipment with booms or extensions	Plan position of transport vehicle to maintain safe distance (>20 ft) from all overhead lines and structures, Use spotters since operator focus may be on vehicle alignment with ramps or other ground level distractions.	FHSHB Section IV (E); ARCHSF019, FHSHB Section III (MM)
		4	Ascending/Descending equipment cab.	Do not hurry through task, wear footwear with good tread and ankle support, maintain 3 points of contact while accessing or egress equipment, no jumping off trailers or truck beds.	FHSHB Section IV (E); ARCHSF019, FHSHB Section III (MM)
2	Pre-operation inspection	1	Pinch hazards to hands	Wear gloves appropriate for hazard while maintaining dexterity. Keep hand in field of vision and watch for and keep hands clear of obvious hazards like door or cover closures. Do not hurry during the removal or placement of covers or equipment components.	

2	Pre-operation inspection	2	Head injury from striking equipment covers or components	Wear hard hat, stay focused on surroundings, avoid standing or raising up suddenly especially if door cover is overhead.	
		3	Exposure to engine fluids or lubricants	Wear protective gloves, ensure MSDS is available for engine fluids and lubricants, promptly wash exposed skin, contact WorkCare immediately for any situation where diesel is injected under the skin.	
		4	Awkward body positions and twisting	Plan inspection activity and do not hurry through task, stretch before crawling or squatting. Avoid overreaching.	
		5	Entanglement in equipment components.	Do not circumvent protective guards or shields, ensure equipment is not operational (LOTO if necessary) when accessing engine compartment if intrusion required.	
3	Equipment operation	1	Strike or impact hazards with other workers, equipment or structures.	Keep eyes moving and watch for unanticipated worker movement. Keep workers 15 ft from any extendable area of the equipment, Maintain 360 degrees of awareness and ensure adequate communication method with other workers. All workers to know emergency STOP hand signals. all back up alarms to be functional.	
		2	Utility contact (subsurface or above ground)	Follow utility clearance procedure prior to any intrusive work with equipment. Immediately stop work if any unusual or unanticipated condition encountered.	
		3	Rollovers on slopes or from improper usage	Follow equipment manufacturer instructions for use on slopes or load capacities, wear seatbelt at all times, Ensure all outriggers, if equipped are properly deployed on stable surface.	
		4	Noise from engine or work activity	Wear hearing protection as required, keep equipment well maintained.	
		5	Slips and falls from accessing or egress from equipment	Maintain 3 points of contact when access or egress equipment, keep any ladder or steps on equipment clean and dry to extent practical, ensure equipment doors, if present, are in good working order.	
		6	Exposure to tools and metal edges and damaged metal resulting in cuts lacerations to hands during maintenance	Wear protective gloves that allow for good dexterity. Mitigate sharp surfaces to extent practical.	
		7	Pinch/crush hazards to hands from doors or covers	wear gloves appropriate for hazard while maintaining dexterity, Watch for and keep hands clear of obvious hazards like door or cover closures. Do not hurry during the removal or placement of covers or equipment components.	
		8	Contact stress to knees and hands	Use padding or knee pads if kneeling on hard surfaces for an extended period of time. Avoid placing weight on hands for extended periods of time.	
4	Maintenance	1	Awkward body positions and twisting	Plan inspection activity and do not hurry through task, stretch before crawling or squatting. Avoid overreaching.	
		2	Excessive force turning bolts or lifting heavy components, decontamination activities.	Use automated methods to loosen tight bolts, do not use excessive force or torque when using hand tools. Do not use "cheater bars"	

4	Maintenance	3	Contact with engine fluids or lubricants	Wear protective gloves, ensure MSDS is available for engine fluids and lubricants, promptly wash exposed skin, contact WorkCare immediately for any situation where diesel is injected under the skin.	
		4	Flying debris during gross decontamination or cleaning activities	Wear adequate eye and face protection when removing soils or solid media form tracks, buckets, or other component of equipment using pressure washer.	
		5	Entanglement in equipment components.	Do not circumvent protective guards or shields, ensure equipment is not operational (LOTO if necessary) when accessing engine compartment if intrusion required.	
		6	Exposure of hands and arms to hot engine components	Take the time to allow the engine to cool, wear protective gloves and forearm protection.	
		7	Struck by moving equipment or boom extensions	Keep at least 15 ft from any extendable area of the equipment, if entering within 15 ft, establish and maintain contact with equipment operator, ear high visibility clothing or work vest.	
5	Working in proximity to heavy equipment	1	Equipment damage from moving equipment	Keep other equipment not required for work outside of heavy equipment work area in all directions. Flag or mark with high visibility markings, cones, etc., any required equipment near the ground	
		2	Noise hazards from equipment operation	Wear hearing protection and increase distance if work activity permits.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)		Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs	as needed	Recommended

Supplies

Type	Supply	Description	Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3349
Job Name	General Industry-Ladders
Task Description	Ladders
Project Number	GP08RAAP4BLA
Project Name	RAAP-044 BLA RESPONSE ACTION
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(1) Initial
Creation Date	8/27/2010 4:34:44 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles				Insco, Ashly	True
Reviewer	Wisbeck, Diane				Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Non-fixed Ladder Selection	1	Improper ladder selection could result in ladder failure	Select ladder with load rating appropriate for work being performed.	Field H&S Handbook section III JJ
		2	Improper ladder selection could result in electrocution	Select non-conductive ladders if working near electrical wiring or other electrical hazard	Field H&S Handbook section III JJ
		3	Use of ladders that are in unsound operational condition may result in injury or death	Inspect all ladders prior to use, do not use a ladder marked "out of service", check ladders for proper operation, good ropes, if equipped, good feet, and free of oil grease or other slick substance on rungs. Check wood ladders for sings of cracking or splitting. Competent person to inspect all ladders prior to use.	Field H&S Handbook section III JJ
2	Non-fixed Ladder transport to work area	1	Lifting and carrying ladders	Use TRACK. Use buddy system when moving heavy ladders or long extension ladders. Don't carry ladders that obstruct view of path forward or use awkward body twist picking up ladders. Use proper lifting techniques.	

2	Non-fixed Ladder transport to work area	2	striking other workers or objects with ladder during carrying	Plan route with ladder, remember to check the rear when turning corners with ladder, use buddy system to carry longer ladders to maintain better control. Look up when moving shorter step ladders vertically.	
		3	Property damage, vehicle damage or injury from improperly secured ladders on vehicles during transport	Make sure ladders are adequately secured such that doors can be operated and driver views are not impaired. Secure in manner that prevents forward or rear movement of ladder if mounted on top of vehicle. Inspect securing devices prior to moving/driving the vehicle. if ladder extends >4 ft from rear of vehicle, attach 18 square inch fluorescent red or orange flag to end.	
3	Working on Non-fixed ladders	1	Muscle strain setting up or taking down ladders	Use buddy system to place/remove heavy or long ladders. Avoid awkward twisting or bending during this activity.	
		2	Falls from ladders	Always maintain 3 points of contact, ladders over 20 ft long equipped with safety fall devices to be utilized by workers, only one worker on ladder at time, ensure ladder extends at least 3 ft above level being accessed. Ensure extension ladder is at a 1ft horizontal to every 4 ft vertical rise to maintain proper angle. Follow all warning label requirements.	
		3	Tipping of ladders that are improperly secured	Ensure ladders are on level firm ground, tie off ladders at top,	
		4	Collapse of ladders that are over extended or over loaded.	Ensure ladder weight ratings are maintained, maintain at least 3 ft of overlap on extension ladders or other overlap length per ladder instructions.	
		5	Struck by objects or debris dropped from ladders	Keep ground workers away from work activities on ladders. Do not walk under occupied ladders.	
4	Fixed ladder work	1	Falls from height causing injury or death	Always maintain 3 points of contact. Utilize ladder fall safety devices if ladder is equipped. Do not hurry when climbing fixed ladders, rest at any landings provided by the ladder.	
		2	Slips on wet or icy rungs creating impact injuries	Inspect for presence of hazard, clear if possible, do not attempt to climb ladders with ice on rungs, use anti-slip footwear and gloves. Maintain 3 points of contact and climb in a slow methodical manner. Use Stop Work authority for any condition making climbing unsafe	
		3	Temperature stress contact stress to hands while climbing	Wear gloves with good dexterity and anti-slip coatings, wear footwear good tread and anti-slip soles. Rest at any landing provided by the ladder. Shift weight to other hand, leg periodically if at one position on the ladder for an extended period of time.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
Hand Protection	work gloves (specify type)	leather	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fall protection (specify type)	if needed for task and ladder type	Recommended
Miscellaneous	first aid kit		Required
Miscellaneous	Other	securing devices for mounting on vehicle	Required
Miscellaneous	Other	flags for transport	Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3348
Job Name	General Industry-Elevated heights operations
Task Description	Man-lift operations
Project Number	GP08RAAP0044
Project Name	AEC/ RAAP-044
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(1) Initial
Creation Date	8/27/2010 4:27:00 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles				Insco, Ashly	True
Reviewer	Wisbeck, Diane				Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Mobilization/demobilization of manlift to work area	1	Tip hazard on uneven or sloped surfaces	Plan route when moving manlift, do not operate on grades or surfaces for which manlift was not designed, familiarize yourself with operation manual and follow all warning information posted on the manlift. Never move with the platform or basket elevated. Ensure all stabilizers or outriggers are retracted during movement. Ensure proper tire inflation.	
		2	Striking other equipment, workers or utility lines during movement	Plan route and ensure other equipment, supplies and debris are removed from route, ensure manlift capable of navigating turns in route and can clear any overhead obstructions along route. Use spotters for all movement activity, regardless of type of manlift used. Wear required PPE for the task to be performed including hard hat.	
2	using manlift for elevated work activities	1	Falls from manlift platform or basket	Use of personal fall arrest system required in basket or platform, ensure all guard rails and gates are functional and in good condition. No leaning over edges of basket or platform. Always lower manlift to ground to access or egress, no climbing up the elevating structure.	
		2	Tipping from uneven weight distribution	Keep weight centered in the basket or platform, ensure stabilizers and outriggers are properly deployed and secured prior to elevated the manlift. Never elevate the manlift on a grade in excess of manufacturer specifications, review operators manual.	
		3	trips and falls on platforms from equipment, tools or debris	Maintain good housekeeping, keep hand tools off of floor or platform, plan work and only carry equipment tools, supplies needed to perform task, for packaged items remove boxes and packaging prior to placing on manlift, when practical.	
		4	manlift malfunction while working at elevated position	Never work alone on manlift, always have buddy on ground level.	
		5	Struck by objects falling from manlift.	tether small tools to manlift or person, maintain any toeboards present, keep workers below clear of manlift work area.	
3	Using personal fall arrest systems	1	Falls from improperly designed or used systems	All aspects of personal fall arrest systems are to be overseen and inspected by a Competent Person, all workers wearing personal fall arrest systems will be trained in the proper use and inspection of the system used.	
4	General inspection activities	1	Improper inspection results in injury, death or property damage from failure of the device or system used.	All inspections to be performed daily and more often as needed due to changes in site conditions or weather by a Competent Person	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fall protection (specify type)		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3352
Job Name	General Industry-Elevated heights operations
Task Description	Scaffolding
Project Number	GP08RAAP0044
Project Name	AEC/ RAAP-044
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(2) Review
Creation Date	8/30/2010 5:18:33 AM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles	9/21/2010			Insco, Ashly	True
Reviewer	Wisbeck, Diane	9/21/2010			Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			
Reviewer	Wisbeck, Diane	Revise	09/01/2010	This is confusing. Is it a man lift or scaffolding. We are going to be working from a manlift. Please get some direction from Chris on the logistics.

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	construction and dismantlement of scaffolding	1	Falls from scaffolding	Plan and construct/deconstruct scaffolding according to manufacture instructions and best management practices. Use fall arrest systems as appropriate, ensure ladders or stair used is secure and placed according to accepted practices (see ladder use JSA for more information)	
		2	Struck by objects dropped or falling from scaffold. Struck by overhead objects.	Keep workers not involved with the scaffold erection/dismantlement away from work area, keep small objects off scaffold platform, ensure toeboards are used and maintained. Tarps will be used to keep overhead objects from falling on personnel. Hard hats must be worn at all times	
		3	improper leveling or securing causing collapse or tipping	Ensure scaffold is level at all time, secure and brace scaffold per scaffold design requirements and Competent Person instruction.	

1	construction and dismantlement of scaffolding	4	Lifting hazards moving scaffold components	Use proper lifting techniques and buddy system for large bulky objects, avoid awkward twisting of the body.	
		5	Cuts scrapes, splinters to hands moving, assembling, disassembling scaffold components	Wear leather gloves, inspect planking prior to movement for signs of splintering.	
2	Performing work on scaffolds	1	Falls accessing or egressing the scaffold	Use properly secured ladder or stairway, for long term scaffold use, use scaffolds with integrated stairs, maintain all guard rails, use personal fall arrest system as prescribed by Competent Person.	
		2	Trips and falls on scaffold planking	Ensure only scaffold rated lumber is used for planking than that is overlapped at least 12 inches and does not extend greater than 6 inches over the end of the scaffold structure, or adequately secured per Competent Person instructions.	
		3	Trips and falls from equipment, tools , supplies, debris on scaffold deck	Maintain good housekeeping, keep hand tools off of floor or platform, plan work and only carry equipment tools, supplies needed to perform task, for packaged items remove boxes and packaging prior to placing on scaffold, when practical.	
		4	Scaffold collapse from uneven weight distribution or exceeding scaffold capacity	All scaffold work activities to be overseen by a Competent Person. Keep weight on scaffold planking centered and secured against shifting. Never exceed scaffold planking weight ratings.	
		5	Struck by objects falling form scaffold	Install and maintain toeboards, keep planking gaps to minimum according to regulatory standards, keep workers from working directly below on different scaffold levels or ground.	
3	Using personal fall arrest systems	1	Falls from improperly designed or used systems	All aspects of personal fall arrest systems are to be overseen and inspected by a Competent Person, all workers wearing personal fall arrest systems will be trained in the proper use and inspection of the system used.	
4	General inspection activities	1	Improper inspection results in injury, death or property damage from failure of the device or system used.	All inspections to be performed daily and more often as needed due to changes in site conditions or weather by a Competent Person	
		2	Slips trips and falls on wet, uneven, or sloped surfaces.	Wear proper foot protection with ankle support and good tread, don't walk while looking up, focus on task at hand which is walking.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fall protection (specify type)		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3350
Job Name	General Industry-Fence installation
Task Description	Fence installation
Project Number	GP08RAAP4BLA
Project Name	RAAP-044 BLA RESPONSE ACTION
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(1) Initial
Creation Date	8/27/2010 4:40:50 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles				Insco, Ashly	True
Reviewer	Wisbeck, Diane				Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Survey Area on Proposed Installation of Fencing and Posts	1	Tripping can occur from uneven walking/working surfaces	Identify and control any trip hazards. Setup work area with least interference to public and surrounding activities.	Employee Field H&S Handbook; Utility Location (ARCHSFS019); H&S Procedure ARCHSFS017
		2	Underground utilities can be hit when doing intrusive work	Follow utility locate H&S Policy	Employee Field H&S Handbook; Utility Location (ARCHSFS019); H&S Procedure ARCHSFS017
		3	Staff can be hit by vehicular traffic, and pedestrians can enter work area	Wear Class II traffic vest when working proximal to vehicular traffic. Use traffic cones to keep pedestrians away.	Employee Field H&S Handbook; Utility Location (ARCHSFS019); H&S Procedure ARCHSFS017
2	Silt Fence Installation - Manual	1	Muscle strains can occur from heavy lifting of materials, or when pounding stakes.	Team lift rolls of silts fence off trucks or trailers. Take breaks when using slide hammer (fence post driver) to drive stakes into ground. Muscles can cramp easily from use of this tool. Stretch muscles as necessary. Keep back straight while lifting hammer as well.	
		2	Hands can be cut from splinters on stakes	Wear leather work gloves.	
		3	Excessive noise can be generated when pounding in stakes.	Use hearing protection as necessary.	
		4	Hand injury can occur when pounding stakes, or surrounding staff can be hit.	Make sure surrounding is clear, and keep in communication with staff. Use the right tool for the job, and wear leather work gloves. When using hammer, keep hands clear of post top. If hands are needed to hold stake to get it started, use heavy type work gloves.	
3	Silt Fence Installation - Powered Equipment	1	Powered equipment can pull in or strike body parts causing injury	Do not stand in front of powered equipment as it sets the silt fence in the ground. Stand where operator can see you and where you can see the line of silt fence being installed. Stay in communication with the equipment operator.	
		2	Fuel spills can occur with refueling equipment	Use approved gas cans for all refueling of equipment. Allow ample time for motor to cool before refueling.	
		3	Use of powered and pressurized tools can cause flying parts or hand injuries.	If using air stapler to connect silt fence to stakes, make sure to keep hands clear during use of stapler. During travel to next stake, keep air stapler pointed away from body and toward the ground.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	boots	steel toe	Required
Hand Protection	work gloves (specify type)	leather work gloves	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Recommended
Miscellaneous PPE	traffic vest--Class II or III	when working proximal to traffic	Recommended

Supplies

Type	Supply	Description	Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)		Required
Traffic Control	traffic cones		Required

Job Loss Analysis

General

Client Name	ARCADIS-AGMI
JSA ID	22
Job Name	General Industry-Site clearing (tree/brush/vegetation) removal
Task Description	Site clearing
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC Name	
Project Manager	NO PROJECT MANAGER
Status	(3) Completed
Creation Date	1/29/2009 8:28:38 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Coppola, Mija	1/31/2009	1/29/2009	True	Coates, Gary	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Coppola, Mija	Approve	01/29/2009	

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Prepping equipment for clearing activities	1	Improperly maintained tools and equipment increase risk for injury to workers using tools/equipment	Maintain tools and equipment according to manufacturer recommendations, including proper oiling and inspection of tool/equipment. Ensure cutting blades are sharp.	
		2	Cuts to hands, fingers, forearms from sharpening tool/equipment blades	Wear protective gloves suitable for the tool/device being sharpened, use proper sharpening techniques and do not hurry through the sharpening process.	
		3	Falls accessing from egressing from large equipment like tractors or bulldozers	Always use 3 points of contact when access/egressing large heavy equipment. Never attempt to access/egress form moving equipment, wear footwear with good anti-slip tread and ankle support, keep mud off of stepping surfaces. Promptly affix seatbelt when sitting in seat.	
		4	Exposure to fuel during refueling activities	Wear protective gloves during refueling activities, avoid breathing fuel vapors by standing in up wind position when practical, promptly wash exposed skin or clothing.	
2	Clearing large brush/trees with heavy equipment	1	Struck by vegetation under tension during clearing	Stand at least 100 ft from clearing activity. Keep unnecessary workers away from clearing activity in all directions.	

2	Clearing large brush/trees with heavy equipment	2	Trip fall hazards on uneven ground surfaces	Plan route and avoid walking over down trees and into vegetation where ground surface can not be seen. Wear footwear with good tread and ankle support, don't carry tools in a manner that can obstruct vision of ground	
		3	Slip or trip on muddy or sloped surfaces	Plan route, wear footwear as above, keep hands out of pockets to balance and brace falls,	
		4	Contact with poisonous or physically damaging plants	Identify and avoid contact, if brush containing poisonous plants being burned, do not stand down wind and inhale smoke, wear long pants and long sleeve shirt, in heavy briar infested areas requiring walking, wear briar chaps.	
		5	Contact with poisonous or biting insects	Watch for and avoid hazardous insects, keep cab doors closed, if equipped, to reduce exposure potential.	
		6	Struck by falling trees or large brush	Keep clear of planned fall direction, assume tree can fall in any direction and keep clear in all fall directions	
3	Clearing large brush/trees with hand tools/chainsaws	1	Cuts to arms, legs, hands from cutting tools or chainsaw	Wear protective gloves. When using chainsaw, using chainsaw chaps and helmet equipped with face shield. When using manual tools cut away form body, maintain large distance between workers using hand tools or chainsaw. When using chainsaws, don't reach over running saw, saw over head height, use saw in low visibility situations, use chainsaws on ladders or use one handed.	
		2	Physical stresses from repetitive motion or excessive push/pulling during clearing	Use job or task rotation or frequent rest breaks. Don't use excessive force pulling or pushing on vegetation.	
		3	Scrapes, cuts to skin from vegetation	Wear protective gloves, long pants and long sleeve shirt. Wear briar chaps in thorny vegetation.	
		4	Noise form chainsaws	Wear hearing protection, keep unnecessary workers away form sawing activity	
4	Clearing small brush/tall grass with mowers/bush hogs	1	Struck by flying debris form mowing activity	Keep unnecessary worker 100 ft form mowing activities	
		2	Foot hazards from slipping into cutting blades using walk behind mowers	Do not remove and promptly repair guards that reduce potential for foot entry into blade housing of mowers. Plan mowing to reduce situations that increase risk of foot slippage towards mower housing, wear steel toe boots with good tread	
		3	Noise from mowing activitie	Wear hearing protection	
5	Using wood chippers	1	Struck by debris being chipped or chips emanating form the chipper	Stand clear of material being drawn into the chipper, stand to the side of the chipper table during vegetation entry. Maintain swinging baffles that prevent throwback of material.	
		2	Cuts/amputation of hands/arm inserting brush into chipper	Only use chippers with a 36 inch or more feed throw at from the cutting knives. Never place hand, feet on top the feed table of the chipper wear protective gloves.	
		3	Noise from chipping activity.	Wear hearting protection	
		4	Injury caused form unplanned movement of chipper.	Chock tires of chipper when operating.	

6	Using herbicides	1	Worker exposure to herbicide during mixing or application.	Follow manufacturer mixing and application instructions, review product MSDS for additional hazards or PPE requirements, wear impermeable gloves and clothing during mixing and application, promptly wash any skin exposed to herbicide, wear safety goggles and face shield during mixing and application	
		2	Fatigue and physical stresses form carrying hand applicator for prolonged period of time.	Use job or task rotation to reduce fatigue. For applicators carried by hand, switch hands periodically, opt for backpack versions of applicators when possible.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	coveralls	when using herbicides	Required
Eye Protection	faceshield	when using herbicides	Required
Eye Protection	safety glasses		Required
Eye Protection	safety goggles	when using herbicides	Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	other	chainsaw chaps	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3346
Job Name	Environmental-Sample cooler handling
Task Description	Soil sampling cooler handling
Project Number	GP08RAAP4BLA
Project Name	RAAP-044 BLA RESPONSE ACTION
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(2) Review
Creation Date	8/27/2010 4:02:59 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles	9/17/2010			Insco, Ashly	True
Reviewer	Wisbeck, Diane	9/17/2010			Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			
Reviewer	Wisbeck, Diane	Revise	09/01/2010	This is an intrusive activity and there is no mention of asbestos and managing exposures. This needs to be updated depending on whether or not respiratory protection is required or recommended.

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Transfer field samples to sample packing area	1	Lifting heavy coolers may result in muscle strain especially to lower back.	Use proper lifting techniques and keep back straight. Use buddy system for large coolers, Use mechanical aids like hand trucks if readily available to move coolers. Do not over fill coolers with full sample containers for temporary movement to the sample prep area. Ensure an adequate supply of sample coolers are in field	
		2	Hazards to hands from broken glass caused by over tightening lids or improper placement in cooler	Inspect all bottles and bottle caps for cracks/leaks before and after filling container. Do not over tighten sample lids. Clean up any broken bottles immediately, avoid contact with sample preservatives. Wear leather gloves when handling broken glass.	

1	Transfer field samples to sample packing area	3	Exposure to chemicals (acid preservatives or site contaminants- abestos and metals) on the exterior of sample bottles after filling.	Wear protective gloves for acid preservatives, safety glasses with side shields, and a respirator if handling asbestos contaminated soil containers(before and after filling), Once filled follow project specific HASP PPE requirements for skin, eye, and inhalation protection.	
		4	Samples containing hazardous materials may violate DOT/IATA HazMat shipping regulations	All persons filling a sample bottle or preparing a cooler for shipment must have complete ARCADIS DOT HazMat shipping training. Compare the samples collected to the materials described in the Shipping Determination for the Project and ensure consistent.	
2	Sample cooler selection	1	Sample coolers with defective handles, lid hinges, lid hasps cracked or otherwise damaged may result in injury (cuts to hands, crushing of feet if handle breaks etc)	Only use coolers that are new or in like new condition, No rope handled coolers unless part of the manufacturer's handle design.	ARCADIS Shipping Guide US-001
		2	Selection of excessively large coolers introduces lifting hazards once the cooler is filled.	Select coolers and instruct lab to only provide coolers of a size appropriate for the material being shipped. For ordinary sample shipping sample coolers should be 48 quart capacity or smaller to reduce lifting hazards.	ARCADIS Shipping Guide US-001
3	Pack Samples	1	Pinch points and abrasions to hands from cooler lid closing unexpectedly	Beware that lid could slam shut; block/brace if needed; be wary of packing in strong winds. New coolers may be more prone to self closing, tilt cooler back slightly to facilitate keeping lid open.	
		2	Awkward body positions and contact stress to legs and knees when preparing coolers on irregular or hard ground surfaces.	Plan cooler prep activities. Situate cooler where neutral body positions can be maintained if practical, like truck tailgate. Avoid cooler prep on gravel rough surfaces unless knees and legs protected during kneeling.	
4	Sealing, labeling and Marking Cooler	1	Cuts to hands and forearms from strapping tape placement or removing old tape and labels	Do not use a fixed, open-blade knife to remove old tags/labels, USE SCISSORS or other safety style cutting device. Only use devices designed for cutting. Do not hurry through task.	
		2	Lifting and awkward body position hazards from taping heavy coolers, dropping coolers on feet during taping.	Do not hurry through the taping tasks, ensure samples in cooler are evenly distributed in cooler to reduce potential for overhanging cooler falling off edge of tailgate/table when taping.	
		3	Improper labeling and marking may result in violation of DOT/IATA Hama shipping regulations delaying shipment or resulting in regulatory penalty	Do not deviate from ARCADIS Shipping Guide or Shipping Determination marking or labeling requirements.	
5	Offering sample cooler to a carrer or lab couriour for shipment.	1	Lifting heavy coolers may result in muscle strain especially to lower back.	See lifting hazard controls above.	

5	Offering sample cooler to a carrer or lab couriour for shipment.	2	Carrier refusal to accept cooler may cause shipping delay and/or result in violation of DOT HazMat shipping regulations.	Promptly report all rejected and refused shipments to the ARCADIS DOT Program Manager. Do Not re-offer shipment if carrier requires additional labels markings or paperwork inconsistent with your training or Shipping Determination without contacting the ARCADIS DOT Compliance Manager.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Hand Protection	chemical resistant gloves (specify type)	nitrile	Required
Hand Protection	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Respiratory Protection	full face respirator	Level B PPE	Required
Respiratory Protection	half face respirator	Level C PPE	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	Other	Scissors	Required

Job Loss Analysis

General

Client Name	U.S. ARMY ENVIRONMENTAL CENTER
JSA ID	3362
Job Name	Environmental-Soil sampling/well installation - manual
Task Description	Surface soil sampling
Project Number	GP08RAAP0044
Project Name	AEC/ RAAP-044
PIC Name	TALELE, TUSHAR
Project Manager	WISBECK, DIANE
Status	(2) Review
Creation Date	8/30/2010 2:13:26 PM
Auto Closed	False

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
HASP Reviewer	Webster, Charles	9/21/2010			Insco, Ashly	True
Reviewer	Wisbeck, Diane	9/21/2010			Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane			

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Sampling set-up	1	Underground utilities could be encountered during hand augering	Conduct a utility clearance with a minimum of 3 lines of evidence. do not use excessive force if hand augering as a line of evidence as this may damage utility.	
		2	Muscle strains can occur from lifting heavy equipment in and out of vehicle	Park as close as possible to the sampling locations. Use proper lifting techniques and avoid twisting of the body.	
		3	Slips/trips/falls could occur from uneven walking and wet working surfaces	Plan route to the location where work will be performed and do not hurry through task. wear footwear appropriate for the condition. do not carry objects that obstruct view of ground ahead.	
2	Installation of hand auger boring	1	Muscle Strains from pulling/pushing could occur when installing the boring, and when removing the auger from the hole	Stretch out Arms/Back/Shoulder Muscles prior to beginning. Using firm grip on handle, slowly turn auger and progress downward in 6" increments.Slowly pull auger from hole, use legs to pull auger out of hole. If water is encountered, a suction will be created when trying to remove the auger. Ask for assistance from another worker if you can't remove safely on your own.	
		2	Hand strain and blisters could develop from prolonged hand augering	Select proper gloves for task, usually leather type work gloves or mechanics style gloves. If hot spots develop on hands (Hot Spots are where blisters start to form) readjust gloves or change to better padded glove. If blisters begin to form, stop work so as not to worsen blistering.	
		3	Over-exertion could occur when trying to force an auger forward if there is refusal.	If refusal occurs, Stop Work. Remove Auger from hole and check hole with flashlight if possible. DO NOT overexert by using excessive force	
		4	Fatigue can occur due to strenuous nature of hand augering activities	Take rest breaks as needed or switch out task with another employee.	
3	Collect Sample Soil Sample	1	Staff can come into contact with impacted soils	Wear PPE as outlined in the HASP. Level C PPE will be required due to abestos impacted soil.	
		2	Sharp edges and broken glassware can cause lacerations	Discard any broken sample containers or glass. Do not overtighten sample containers.	
		3	Containerizing and moving soil cuttings can cause muscle strains	Dispose of left over soil cuttings in a drum or bucket and dispose properly. Only fill buckets half full due to weight and strength of bucket. Wear leather work gloves and use good lifting techniques when handling buckets.	
4	Decon Hand Auger	1	Exposure to COCs while deconing equipment.	Wear chemical protective gloves as outlined in the HASP, and wear safety glasses.	
		2	Cleaning solutions can splash while deconing equipment	Use PPE as outlined in this JLA, and try to minimize splashing. do not hurry through task.	
		3	The end of the hand auger has sharp edges, and lacerations can occur	Use brush to scrub off soils and not hands. Do not reach into the nose (the end with teeth) of the auger with hand.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
Hand Protection	work gloves (specify type)	leather or equivalent (per SSO)	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III	Class II	Required
Respiratory Protection	full face respirator	If Level B PPE is required	Required
Respiratory Protection	half face respirator	asbestos cartidages	Required

Supplies

Type	Supply	Description	Required
Decontamination	Decon supplies (specify type)		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)	bottle	Required
Traffic Control	traffic cones		Required

Attachment 3

Health and Safety Plan Forms

ARCADIS

SITE ACTIVITIES TAILGATE HEALTH & SAFETY BRIEFING FORM

This briefing form documents the tailgate briefing conducted in accordance with the HASP. Personnel who perform work operations on site are required to attend each briefing and to acknowledge receipt of each briefing, at least daily.

Project Number:		**Project Name:**	
Date:	**Time:**	**Briefing Conducted by:**	
Company:		**Signature/Title:**	

TRACKing the Tailgate Briefing

Think through the Tasks (list the tasks for the day):

1 _____ 3 _____ 5 _____

2 _____ 4 _____ 6 _____

Recognize the hazards (check all those that are discussed) and **A**ssess the Risks (Low, Medium, High-circle risk level)

☐ Confined Space	(L M H)	☐ Buried/Overhead Utilities	(L M H)	☐ Excavation	(L M H)
☐ Walking/Working surfaces	(L M H)	☐ Chemical Exposure	(L M H)	☐ Noise	(L M H)
☐ Thermal Stress (Hot/Cold)	(L M H)	☐ Overhead Hazards	(L M H)	☐ Traffic/Roadway/Railway	(L M H)
☐ Severe Weather	(L M H)	☐ Chemical Usage	(L M H)	☐ Elevated work	(L M H)
☐ Hazardous Energy	(L M H)	☐ Heavy Machinery	(L M H)	☐ Biological/Animals	(L M H)
☐ Ergonomic	(L M H)	☐ Personal Safety/Security	(L M H)	☐ Mining	(L M H)
☐ Client/Other Site Activities	***List***	☐ Chemical Exposure	***List***	☐ Other	***Specify***
_____	(L M H)	_____	(L M H)	_____	(L M H)
_____	(L M H)	_____	(L M H)	_____	(L M H)
_____	(L M H)	_____	(L M H)	_____	(L M H)

Control the hazards (Check all those methods to control the hazards that apply):

☒ **STOP WORK AUTHORITY** (Must be addressed in every Tailgate meeting-*See H&S Handbook for definition*)

☐ General PPE Usage	☐ Hearing Conservation	☐ Respiratory Protection
☐ Personal Hygiene	☐ Exposure Guidelines	☐ Decon Procedures
☐ Emergency Action Plan	☐ Fall Protection	☐ Work Zones/Site Control
☐ JSA to be developed/used ***(specify)***	☐ LPO conducted ***(specify job/JSA)***	☐ Other ***(specify)***
_____	_____	_____
_____	_____	_____
_____	_____	_____

Personnel Sign-in List

Printed Name	Signature

Keep H&S 1st in all things

Use the back to add comments such as recent near misses, injuries or property damage, visitors to the site, etc

SITE ACTIVITIES TAILGATE HEALTH & SAFETY BRIEFING FORM

Additional Comments:

Discussion of recent results of LPOs conducted on the project:

Discussion of recent Near-miss, injuries, and/or property damage on the project:

List Visitors to Site Today:

Real Time Exposure Monitoring Data Collection Form

Document all air monitoring conducted on the Site below. Keep this form with the project file.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

Calibration Method: (Material used settings, etc.)	
Calibration Results:	
Calibrated By:	

Activity Being Monitored	Compounds/Hazards Monitored	Time	Reading	Action Required? Y/N

Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

_____

_____

Employee Signature Form

I certify that I have read, understand, and will abide by the safety requirements outlined in this HASP.

Printed Name	Signature	Date

Subcontractor Acknowledgement: Receipt of HASP Signature Form

ARCADIS claims no responsibility for the use of this HASP by others although subcontractors working at the site may use this HASP as a guidance document. In any event, ARCADIS does not guarantee the health and/or safety of any person entering this site. Strict adherence to the health and safety guidelines provided herein will reduce, but not eliminate, the potential for injury at this site. To this end, health and safety becomes the inherent responsibility of personnel working at the site.

Printed Name	Company	Signature	Date

Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release and discharge the owner of the site and ARCADIS and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the site and in any way arising from or related to any and all known and unknown conditions on the site.

Name	Company	Reason for Visit	Date/Time On Site	Date/Time Off Site

Hazardous Materials Transportation Form

	Vehicle (place X in box)	Type (pick-up, car, box truck, etc.)
Personal		
Rental		
ARCADIS owned/leased		
Government owned		
Trailer		

Materials Transported	Quantity	Storage/Transport Container

List Trained Drivers:

_____

_____

Hazardous Materials Shipment Form

Material Description and Proper Shipping Name (per DOT or IATA)	Shipment Quantity	DOT Hazard Classification	Shipment Method (air/ground)

List Shipper (i.e., who we are offering the shipment to):

_____

_____

List Trained Employee(s):

_____

_____

Daily Inspection Form

DAILY HEAVY EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT I.D. NO:_____

EQUIPMENT NAME: _____

DATE: ____/____/_____ PROJECT #: _____ CONTRACT #: _____

ITEM INSPECTED	Inspectors Initials
Falling Object Protective Structure (FOP)	
Roll-Over Protective Structure (ROP)	
Seat Belts	
Operators Seat Bar(s)	
Side Shields, Screens or Cabs	
Lift Arm Restraining Device	
Grab Handles	
Back Up Alarm(s) – Working	
Lights	
Guards	
Horn	
Anti-Skid Tread Steps Clear of Mud	
Safety Signs (Counterbalance swing area)	
Fire Extinguisher (arrow in green, monthly inspection)	
General Condition	
Fuel Condition	
Oil (Full, No Leaks)	
Clear of Extra Materials	
Controls Function Properly	
Damaged Parts	
Hydraulic System (Full, No Leaks)	
Parking Brake	
Lift Arm and Bucket	
Tires/Tracks	
Steering	
Hours at Time of Inspection	
Time Inspected	
Site Name	
Inspectors Name (Printed)	

INSTRUCTIONS – Inspect all applicable items indicated each shift prior to use. Note any unsatisfactory conditions on the back of this sheet and bring to the attention of the supervisor immediately. Operators are required to sign in on this sheet the first time that they operator the equipment each day.

Heavy Machinery and Certification Requirements

Purpose

The purpose of this procedure is to present the minimum safety performance requirements for the operation of heavy equipment on ARCADIS project sites. Project Managers are responsible for ensuring all equipment used on an ARCADIS site is certified and that equipment owners have submitted the attached Machinery and Mechanized Equipment form.

General Requirements

All equipment shall comply with all applicable requirements for motor vehicles and material handling heavy equipment contained in 29 CFR 1926 Subpart O. Heavy equipment includes, but is not limited to, drill rigs, front-end loaders, backhoes, tractors, bulldozers, forklifts, cranes, derricks and similar equipment used for the implementation of the Project Statement of Work.

Equipment Safety Inspections

The following requirements general guidelines for certifying equipment is in safe operating condition for activities commenced at the site and during site operations. The following guidelines are not meant to be all-inclusive.

- All machinery and mechanized equipment will be certified to be in safe operating condition by a competent individual, (using the attached form), within seven days of initial onsite operation.

    - Certification is valid for one year.

- Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.

- Inspections shall include, but are not limited to: all hydraulic lines and fittings for wear and damage, all cable systems and pulleys for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.

- The driller in charge on a daily basis shall inspect drill rigs and related support equipment and vehicles. These inspections shall be recorded/documented.

- Preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or established internal policies, schedules, and equipment SOPs.

- Only designated qualified persons shall operate machinery and mechanized equipment.

- Records of tests and inspections shall be maintained at the site by the operating contractor, and shall be made available upon request of the designated authority, and shall become part of the official project file.

- Equipment not found to be in safe operating condition, or when a deficiency affecting the safe operation of the equipment is identified, the equipment shall immediately be taken out of service and its use prohibited until safe conditions have been corrected.

- All equipment shall have the bucket in the lowered position when not in use and shall be completely contaminated. Equipment will be decontaminated within designated decontamination areas. Note: this not typical for construction sites. It would be for remediation sites.

- All Equipment must have an audible alarm that sounds when equipment is moving in reverse.

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TO: DATE:

FROM:

Pro□□ct Nam□:

Pro□□ct Location:

1. T□is form □rovid□s c□rtification of mac□in□ry and m□c□ani□□d □□ui□m□nt to □□ us□d on t□□ r□f□r□nc□d □ro□□ct for t□□ fo□owing wor□:

D□scri□tion of □□ui□m□nt wor□:	
Pro□□ct Sit□:	
Own□r of □□ui□m□nt: Addr□ss:	
Dat□s (duration) of □□ui□m□nt wor□:	

2. Ins□□ction and c□rtification of mac□in□ry and m□c□ani□□d □□ui□m□nt, as r□□uir□d □y ARCADIS Pro□□ct T□am □as □□□n mad□ □rior to, □ut wit□in s□v□n ca□□ndar days advanc□ of, us□ on t□□ □ro□□ct sit□. R□-c□rtification wi□□□□ r□□uir□d for □□ui□m□nt t□at is us□d on t□□ □ro□□ct sit□ for mor□ t□an on□ y□ar.

Id□ntification of □□ui□m□nt (ma□□, mod□□, s□ria□ no.)		Dat□ of C□rtification
1		
2		
3		

3. T□□ a□ov□ □ist□d □□ui□m□nt □as □□□n ins□□ct□d and t□st□d as indicat□d a□ov□, and is CERTIFIED TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:

Nam□		Tit□□	
Com□any			
Signatur□		Dat□	

4. If t□□r□ ar□ any □u□stions r□garding t□is c□rtification, □□as□ contact t□□ fo□owing ARCADIS Pro□□ct T□am r□□r□s□ntativ□: _____.

DAILY PREA E I ENT INSPECTION CHECKLIST

EQUIPMENT I.D. NO:_____

EQUIPMENT NAME: _____

DATE: ____/____/_____ PROJECT #: _____ CONTRACT #: _____

ITEM INSPECTED	Inspection Initials
Falling Object Protective Structure (FOPS)	
Roll-Over Protective Structure (ROPS)	
Seat Belts	
Operators Seat Bar(s)	
Side Shields, Screens or Cabs	
Lift Arm Restraining Device	
Grab Handles	
Back Up Alarm(s) & Working	
Lights	
Guards	
Horn	
Anti-Skid Tread Steps Clear of Mud	
Safety Signs (Counterbalance swing area)	
Fire Extinguisher (arrow in green, monthly inspection)	
General Condition	
Fuel Condition	
Oil (Full, No Leaks)	
Clear of Extra Materials	
Controls Function Properly	
Damaged Parts	
Hydraulic System (Full, No Leaks)	
Parking Brake	
Lift Arm and Bucket	
Tires/Tracks	
Steering	
Hours at Time of Inspection	
Time Inspected	
Site Name	
Inspectors Name (Printed)	

INSTRUCTIONS # Inspect all applicable items indicated each shift prior to use. Note any unsatisfactory conditions on the back of this sheet and bring to the attention of the supervisor immediately. Operators are required to sign in on this sheet the first time that day operator the equipment each day.

H&S - Excavation Print

General

Observed Company	(•) Arcadis ( ) Other Company
Observation Type	ARCADIS Employee to Subcontractor
LPO Form	H&S - Excavation
Task Observed	
Observee Name	
Observer Name	
Observation Date	
Observation Due Date	
Observee Supervisor	
Project Number	
Project Name	
Client Name	

Feedback Session

Feedback Conducted By	
Date and Time	
Positive Comments	

Observations

Task	Correct	Questionable	Comments
H&S - Excavation			
Equipment Care and Maintenance			
PPE worn according to HASP/JLA specifications and inspected before use	☐	☐	
Conduct equipment walk- around for any obstacles that can damage heavy equipment	☐	☐	
Excavation shield systems inspected for damage prior to installation	☐	☐	
Hoisting and rigging systems inspection and documentation before use	☐	☐	
Ladders inspected before use	☐	☐	

STOP work authority used where appropriate	☐	☐	
Work Environment			
Underground utility locates completed, and locations marked	☐	☐	
Work zones and equipment swing radius demarcated	☐	☐	
Excavation sidewalls properly sloped/Benched to meet design requirements of soil type	☐	☐	
Excavation support systems provide stability of adjacent structures, walls, roadways, etc.	☐	☐	
Excavation inspected by competent person prior to entry and anytime conditions change	☐	☐	
Excavation atmosphere tested prior to and during entry per HASP/JLA	☐	☐	
Surface water/run-off diverted from excavation	☐	☐	
Excavation spoils back minimum 2 feet from sidewall edge	☐	☐	
Entrants protected from falling/loose soils, rocks, etc.	☐	☐	
Entrants provided with appropriate entry ramps, ladders	☐	☐	
For trenches > 4 ft. deep, means of escape provided every 25 ft	☐	☐	
Open excavations protected to prevent falls	☐	☐	
Work Procedures – Equipment Operator			
Routinely checks edge of excavation for potential sidewall collapse	☐	☐	
Conduct 360° walk-around prior to operating equipment	☐	☐	
Stops work, grounds equipment attachments when ground personnel approach equipment and before exiting machine	☐	☐	
3-Points of contact when mounting and dismounting equipment	☐	☐	
Does not exceed rated lifting load for equipment Tag lines used during hoist operations	☐	☐	
Not working under elevated loads	☐	☐	
Operates at safe distance when excavation occupied	☐	☐	
Equipment deconned per HASP/JLA	☐	☐	
Work Procedures – Working around/in excavation			
Maintains safe distance from equipment at full reach	☐	☐	
Makes eye contact with equipment operator when approaching equipment	☐	☐	
Maintains safe distance from excavation edge	☐	☐	
Emergency and rescue equipment available	☐	☐	
Deconned per HASP/JLA	☐	☐	
Any additional safety issues identified?	☐	☐	

Solutions and Root Cause Analysis

Contributing Factors	Root Causes

Explanation of Root Cause(s) Analysis Numbers (RCA No):
1 Lack of skill or knowledge
2 In the past, did not follow procedures or acceptable practices and no incident occurred
3 Doing the job according to procedures or acceptable practices takes more time or effort
4 Short-cutting procedures or acceptable practices is positively reinforced or tolerated
5 Lack of or inadequate operational procedures or work standards
6 Inadequate communication of expectations regarding procedures or acceptable practices
7 Inadequate tools or equipment
8 External factors

Item No	RCA No	Solution(s): How to Prevent Questionable Behavior From Reocurring	Person Responsible	Due Date	Completed	Verified / Validated

Solution Verification & Validation Comments

Standard Review

Reviewed By	Position/Title	Date

Desktop Quality Review

Reviewed By	Position/Title	Date

Filed Verification & Validation

Reviewed By	Position/Title	Date

H&S - Field Multi-task (General) Print

General

Observed Company	(•) Arcadis ( ) Other Company
Observation Type	Peer to Peer
LPO Form	H&S - Field Multi-task (General)
Task Observed	
Observee Name	
Observer Name	
Observation Date	
Observation Due Date	
Observee Supervisor	
Project Number	
Project Name	
Client Name	

Feedback Session

Feedback Conducted By	
Date and Time	
Positive Comments	

Observations

Task	Correct	Questionable	Comments
H&S - Field Multi-task (General)			
General			
PPE worn according to HASP/JLA specifications and inspected before use	☐	☐	
STOP work authority used where appropriate	☐	☐	
Body Use/Positioning			
Proper lifting/pushing / pulling techniques used (no awkward positions/posture; no twisting or excessive reaching; no straining; no excessive weight; load under control/stable; etc.)	☐	☐	
Body parts away from pinch points (clear or			

protected from being caught between objects/equipment or from contacting sharp objects/edges, etc.)	☐	☐	
Body parts not in the Line of Fire (protected from being struck by traffic, equipment, falling/flying objects, etc.)	☐	☐	
Work Procedures/Environment			
Correct type and number of barricades/warning devices/cones	☐	☐	
Communication with others when necessary (hand signals, flags, etc.)	☐	☐	
Right tools and equipment selected for the job and inspected before use	☐	☐	
Tools and equipment used properly	☐	☐	
Housekeeping performed (work areas and pathways clear of hazards, uneven surfaces addressed, etc.)	☐	☐	
Slip/trip/fall hazards addressed (path selected and cleared, eyes on path, speed, footing, etc.)	☐	☐	
Proper energy control (electrical systems grounded, lock out / tag out performed, isolated, cords / fixtures in good condition, GFCI inspected and utilized when appropriate and used properly, etc.)	☐	☐	
Protected from overhead/underground utilities (proper clearance, properly marked, spotters as necessary, etc.)	☐	☐	
Safe work on/near water (appropriate flotation device, appropriate boat for body of water and operation of boat, etc.)	☐	☐	
Chemical/Radiation protection (decontamination ones set up properly, air monitoring completed and logged, etc.)	☐	☐	
Fall from elevated height prevention (maintains 3-points of contact, appropriate ladder, mounting/dismounting vehicle/equipment, fall arrest system, etc.)	☐	☐	
Any additional safety issues identified?	☐	☐	

Solutions and Root Cause Analysis

Contributing Factors	**Root Causes**

Explanation of Root Cause(s) Analysis Numbers (RCA No):
1 Lack of skill or knowledge

2 In the past, did not follow procedures or acceptable practices and no incident occurred
3 Doing the job according to procedures or acceptable practices takes more time or effort
4 Short-cutting procedures or acceptable practices is positively reinforced or tolerated
5 Lack of or inadequate operational procedures or work standards
6 Inadequate communication of expectations regarding procedures or acceptable practices
7 Inadequate tools or equipment
8 External factors

Item No	RCA No	Solution(s): How to Prevent Questionable Behavior From Reocurring	Person Responsible	Due Date	Completed	Verified / Validated

Solution Verification & Validation Comments

Standard Review

Reviewed By	Position/Title	Date

Desktop Quality Review

Reviewed By	Position/Title	Date

Filed Verification & Validation

Reviewed By	Position/Title	Date

H&S - Driving - Smith System 5 Keys Print

General

Observed Company	(•) Arcadis ( ) Other Company
Observation Type	Peer to Peer
LPO Form	H&S - Driving - Smith System 5 Keys
Task Observed	
Observee Name	
Observer Name	
Observation Date	
Observation Due Date	
Observee Supervisor	
Project Number	
Project Name	
Client Name	

Feedback Session

Feedback Conducted By	
Date and Time	
Positive Comments	

Observations

Task	Correct	Questionable	Comments
H&S - Driving - Smith System 5 Keys			
General			
Performed vehicle inspection using vehicle inspection checklist	☐	☐	
Seat, steering wheel and mirrors properly adjusted	☐	☐	
Secured loose items	☐	☐	
Key 1 - Aim High in Steering			
Looks 15 seconds ahead	☐	☐	
Anticipates actions of others (evaluates relevant/non-relevant objects)	☐	☐	

Elevates eyes around corners and turns	☐	☐	
Strives to drive in the lane of least resistance	☐	☐	
Key 2 - Get the Big Picture			
Uses 4 second rule as following distance; adds 1 second for each additional hazard	☐	☐	
Observes traffic ahead, to the side and rear	☐	☐	
Observes pedestrians, bicyclist and animals (evaluates relevant/non-relevant objects) Observing signs and signals	☐	☐	
Adjusts speed for weather and road conditions	☐	☐	
Key 3 - Keep Your Eyes Moving			
Scans intersections prior to “point of no return”	☐	☐	
Checks mirrors every 6-8 seconds	☐	☐	
Checks mirrors prior to slowing or stopping	☐	☐	
Checks blind spot when changing lanes	☐	☐	
Moves eyes every 2 seconds (avoids blank/fixed stares)	☐	☐	
Key 4 - Leave Yourself An Out			
Stops 1 car length behind vehicle ahead at intersections and allows vehicle ahead to move before accelerating	☐	☐	
Stops 1 car length behind intersection line	☐	☐	
Uses “space cushions” in traffic	☐	☐	
Brakes early and gradually	☐	☐	
Key 5 - Make Sure They See You			
Effectively times use of the turn indicator and uses signals appropriately	☐	☐	
Establishes eye contact with other drivers	☐	☐	
Looks at rear-view mirror at initiation of brake pedal	☐	☐	
Uses the horn properly to signal others	☐	☐	
Parking and Backing			
Maintains proper speed in parking lot	☐	☐	
Selects parking places to pull through without backing	☐	☐	
Backs into parking places when pull through not available	☐	☐	
Selects parking place away from other vehicles/cart return when safe to do so	☐	☐	
Checks the backing area first	☐	☐	
Backs slowly and carefully	☐	☐	
Looking at all sides when backing	☐	☐	
Backs no further than necessary	☐	☐	
Maintains eye contact with pedestrians and	☐	☐	

other moving vehicles in parking lot			
Vehicle is legally parked	☐	☐	
Sets parking brake and secures vehicle	☐	☐	
Any additional safety issues identified?	☐	☐	

Solutions and Root Cause Analysis

Contributing Factors	**Root Causes**

Explanation of Root Cause(s) Analysis Numbers (RCA No):
1 Lack of skill or knowledge
2 In the past, did not follow procedures or acceptable practices and no incident occurred
3 Doing the job according to procedures or acceptable practices takes more time or effort
4 Short-cutting procedures or acceptable practices is positively reinforced or tolerated
5 Lack of or inadequate operational procedures or work standards
6 Inadequate communication of expectations regarding procedures or acceptable practices
7 Inadequate tools or equipment
8 External factors

Item No	RCA No	Solution(s): How to Prevent Questionable Behavior From Reocurring	Person Responsible	Due Date	Completed	Verified / Validated

Solution Verification & Validation Comments

Standard Review

Reviewed By	Position/Title	Date

Desktop Quality Review

Reviewed By	Position/Title	Date

Filed Verification & Validation

Reviewed By	Position/Title	Date

ARCADIS

Document Control Number:TGM - _____

TGM – *project number plus date as follows: xxxxxxxx.xxxx.xxxxx - dd/mm/year*

TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

Name			**Location**
Date	**Time**	**Client**	**Site Type**
Client		**Client Contact**	**Site Contact**

TASK TO BE PERFORMED

Tasks throughout the Task (list the tasks for the day):

1 _____ 3 _____ _____

2 _____ 4 _____ _____

Other Personnel Activities – Check if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations ☐ If there are none, write None: _____

If yes, describe them here: _____

How will they be controlled _____

Does the Activity require any of the following? Check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	Doc #		Doc #		Doc #
☐ Not Applicable		☐ Working at Height		☐ Confined Space	
☐ Energy Isolation (LOTO)		☐ Excavation/Trenching		☐ Hot Work	
☐ Mechanical Lifting Ops		☐ Overhead & Buried Utilities		☐ Other Permit	

Discuss the following items with your crew: Check all that apply

☐ Incidents from day before to review	☐ Lessons learned from the day before	☐ Any Stop Work Interventions yesterday
☐ Any corrective actions from yesterday	☐ Will any work deviate from plan	☐ If deviations, notify PM & client
☐ JLAs or procedures are available	☐ Field teams to dirty JLAs, as needed	☐ Adjustment & Close
☐ Staff has appropriate PPE	☐ Staff knows Emergency Plan (EAP)	☐ Staff knows gathering points
☐ Topics from Corp H&S to cover		

Comments: _____

Identify the hazards (check all that are discussed) (Examples are provided) and Assess the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

☐ Gravity (i.e., ladder, scaffold, trips) (L M H)	☐ Motion (i.e., traffic, moving water) (L M H)	☐ Mechanical (i.e., augers, motors) (L M H)
☐ Electrical (i.e., utilities, lightning) (L M H)	☐ Pressure (i.e., gas cylinders, webs) (L M H)	☐ Environment (i.e., heat, cold, ice) (L M H)
☐ Chemical (i.e., fuel, acid, paint) (L M H)	☐ Biological (i.e., ticks, poison ivy) (L M H)	☐ Radiation (i.e., arc flash, sun, laser) (L M H)
☐ Sound (i.e., machinery, generators) (L M H)	☐ Personal (i.e. addiction, night, not fit) (L M H)	☐ Driving (i.e. car, ATV, boat, door) (L M H)

CONFIRM TASK HAZARD ANALYSIS

TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2

Control the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.

☒	**STOP WORK AUTHORITY** (Must be addressed in every Tailgate meeting - (*See statements below*)				
☐	Elimination	☐	Substitution	☐	Isolation
☐	Engineering controls	☐	Administrative controls	☐	Monitoring
☐	General PPE Usage	☐	Hearing Conservation	☐	Respiratory Protection
☐	Personal Hygiene	☐	Exposure Guidelines	☐	Decon Procedures
☐	Emergency Action Plan (EAP)	☐	Fall Protection	☐	Work Zones/Site Control
☐	JLA to be developed/used ***(specify)***	☐	LPO conducted ***(specify job/JLA)***	☐	Traffic Control
☐		☐		☐	Other ***(specify)***
☐		☐		☐	

Signature and Certification Section - Site Staff and Visitors

Name/Company/Signature	Initial & Sign in Time	Initial & Sign out Time	I have read and understand the HASP

Important Information and Numbers

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call WorkCare at 1.800.455.6155 and then notify the field supervisor who will, in turn, notify Corp H&S at 1.720.344.3844.

In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

In the event of a utility strike or other damage to property of a client or 3rd party, employees will immediately notify the field supervisor, who will then immediately notify Corp Legal at 1.678.373.9556 and Corp H&S at 1.720.344.3500

Visitor Name/Co - not involved in work

In Out

In Out

In Out

In Out

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB,** I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

- ☐ Lessons learned and best practices learned today: _____
- ☐ Incidents that occurred today: _____
- ☐ Any Stop Work interventions today? _____
- ☐ Corrective/Preventive Actions needed for future work: _____
- ☐ Any other H&S issues: _____

Keep H&S 1st in all things

WorkCare - 1.800.455.6155
Near Loss Hotline - 1.866.242.4304

Attachment 4

ARCADIS Respiratory Protection and Medical Monitoring Certificates

ARCADIS
infrastructure, environment, buildings

Respirator Program Fit Test Form and Employee Checklist

Employee Name: White (Last) Bob (First)

Employee Number: 10348 **Date:** 12/8/10

Office: Baltimore, MD **Division:** ENV **Business practice:** SER1

Checklist Item	OK
Respirator Training	☑
Medical Review/Exam **(mandatory)** *Date completed:* 9/27/2010	☑
Medical Clearance Records on File	☑

Fit Test Method: ✓ Qualitative; Test Agent Used: Bitrex

Model: North Type: 7600 Size: M/L

___ Quantitative; Model: _____ Size: _____

Response:	**Passed**	**Failed**	**Fit Factor (QN)**
Normal Breathing	☑	☐	____
Deep Breathing	☑	☐	____
Turning Head Side to Side	☑	☐	____
Moving Heads Up and Down	☑	☐	____
Talking	☑	☐	____
Grimace	☑	☐	____
Bending Over	☑	☐	____
Normal Breathing	☑	☐	____
~~Pass or Fail (Qualitative Fit Test)~~	☐	☐	____
~~Overall Fit Test Factor:~~ (from Portacount)	☐	☐	____

Employee: Printed name Robert White

Signature Robt White

Test Administrator: Printed name William Kahl

Signature Wm R Kahl

Company ARCADIS.

WORKCARE™
Making Health Count

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	**White, Robert**	**COMPANY:**	**ARCADIS**
ID:		**POSITION:**	**Environmental Engineer**
DATE OF EXAM:	**09/27/2010**	**LOCATION:**	**ARCADIS-Millersville, MD (Baltimore)**
EXPIRATION DATE:	**09/27/2011**	**SITE:**	

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 10/05/10

Signature: Peter P Greaney MD

Certificate of Completion

David Forrand

has satisfactorily passed all the requirements of:

A QUALITATIVE FIT TEST – IRRITANT SMOKE (STANNIC CHLORIDE) PROTOCOL AS OUTLINED IN 29 CFR 1910.134 (f) FIT TESTING AND HAS RECEIVED RESPIRATORY PROTECTION TRAINING, AS OUTLINED IN 29 CFR 1910.134 (k) TRAINING AND INFORMATION

Conducted by the Training and Education Division of
ARCADIS/LFR Inc., 194 Forbes Road, Braintree, Massachusetts

Fit Testing was Performed with the Following Respirator:

North 7700 half-face air purifying respirator (Large)

13956-2010
Certificate Number

July 7, 2010
Date

July 7, 2011
Expiration Date

ARCADIS
Infrastructure, environment, buildings

Fit Test Administered By

Director

WORKCARE®
Making Health Count

Medical Examiner's Certificate

I certify that I have examined

FORRAND, DAVID

In recognition of having received

[X] Medical Clearance [X] Respirator Clearance

In compliance with 29CFR 1910.120 and 1910.134

A completed examination for this person is on file at my office. For further info please contact me at (800) 455-6155.

9/13/10 — Exam Date

Physician's Signature

WORKCARE™
Making Health Count

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	**Grabowski, Sandra**	**COMPANY:**	**ARCADIS**
ID:		**POSITION:**	**Environmental Geologist**
DATE OF EXAM:	**03/26/2010**	**LOCATION:**	**ARCADIS-Millersville, MD (Baltimore)**
EXPIRATION DATE:	**03/26/2011**	**SITE:**	**Baltimore**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 04/01/10

Signature: Peter P Greaney MD

Exhibit 3 - Respirator Program Fit Test Form and Employee Checklist

Employee Name: Grabowski (Kamas) Sandra
Last First

Employee Number: 10787

Date: 11/23/2010

Office: Millersville, MD

Division: ENV

Business practice: SER 1

Checklist Item	OK
Respirator Training	☑
Medical Review/Exam **(mandatory)** *Date completed:* 3/26/2010	☑
Medical Clearance Records on File	☑

Fit Test Method: ✓ Qualitative; Test Agent Used: Bitrex

Model: 3M Type: 7800S Size: S

___ Quantitative; Model: _____ Size: _____

Response:	**Passed**	**Failed**	**Fit Factor (QN)**
Normal Breathing	☑	☐	____
Deep Breathing	☑	☐	____
Turning Head Side to Side	☑	☐	____
Moving Heads Up and Down	☑	☐	____
Talking	☑	☐	____
Grimace	☑	☐	____
Bending Over	☑	☐	____
Normal Breathing	☑	☐	____
Pass or Fail (Qualitative Fit Test)	☑	☐	____
Overall Fit Test Factor: (from Portacount)	☐ N/A	☐	____

Employee: Printed name Sandra Grabowski (Kamas)
Signature [signature]

Test Administrator: Printed name William Kahl
Signature [signature]
Company ARCADIS

ARCADIS

Respirator Program Fit Test Form and Employee Checklist

Employee Name: Carr (Last) Keith (First)

Employee Number: 11948 **Date:** 12/6/10

Office: Bluefield **Division:** Env. **Business practice:** Field Services

Checklist Item	OK
Respirator Training	☑
Medical Review/Exam **(mandatory)** *Date completed:* 1/29/2010	☑
Medical Clearance Records on File	☑

Fit Test Method: ✓ Qualitative; Test Agent Used: Bitrex Fit test + Sensitivity Solution Applicator

Model: North Type: Full face Size: Small

✓ Quantitative; Model: _____ Size: _____

Response:	Passed	Failed	Fit Factor (QN)
Normal Breathing	☑	☐	____
Deep Breathing	☑	☐	____
Turning Head Side to Side	☑	☐	____
Moving Heads Up and Down	☑	☐	____
Talking	☑	☐	____
Grimace	☑	☐	____
Bending Over	☑	☐	____
Normal Breathing	☑	☐	____
Pass or Fail (Qualitative Fit Test)	☑	☐	____
Overall Fit Test Factor: (from Portacount)	☑	☐	____

Employee: Printed name W. Keith Carr

Signature W. Keith Carr

Test Administrator: Printed name Jason Artrip

Signature Jason Artrip

Company ARCADIS

MEDICAL EXAMINER'S CERTIFICATE

I certify that I have examined WILLIAM K. CARR in accordance with the Federal Motor Carrier Safety Regulations (49 CFR 391.41-391.49) and with knowledge of the driving duties, I find this person is qualified; and, if applicable, only when:

- ☐ wearing corrective lenses
- ☐ wearing hearing aid
- ☐ accompanied by a _____ waiver/exemption
- ☐ driving within an exempt intracity zone (49 CFR 391.62)
- ☐ accompanied by a Skill Performance Evaluation Certificate (SPE)
- ☐ qualified by operation of 49 CFR 391.64

The information I have provided regarding this physical examination is true and complete. A complete examination form with any attachment embodies my findings completely and correctly, and is on file in my office.

SIGNATURE OF MEDICAL EXAMINER: PETER GREANEY	TELEPHONE: 800 455-8155	DATE: 5/24/10
MEDICAL EXAMINER'S NAME (PRINT): P Greaney	☑ MD ☐ DO ☐ Chiropractor ☐ Physician Assistant ☐ Advanced Practice Nurse	
MEDICAL EXAMINER'S LICENSE OR CERTIFICATE NO. / ISSUING STATE: A35541 / CA.		
SIGNATURE OF DRIVER: W. Kirk Carr	DRIVER'S LICENSE NO.: A23 93 1502	STATE: VA
ADDRESS OF DRIVER: 4239 Top Top Rd. N. Tazewell, Va. 24630		
MEDICAL CERTIFICATE EXPIRATION DATE: 01/29/2012	WORKCARE® Making Health Count	

American Heart Association

Learn and Live

Heartsaver® First Aid

W. Keith Carr

This card certifies that the above individual has successfully completed the objectives and skills evaluations in accordance with the curriculum of the AHA for Heartsaver First Aid Program.

Modules Completed: Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

12/17/2009
Issue Date

12/17/2011
Recommended Renewal Date

Training Center: **West Virgina**

TC Address Contact Info: **Cintas First Aid & Safety**

Course Location: **Arcadis**

Instructor: **Mark Ratliff**

Holder's Signature

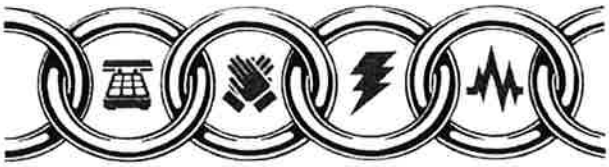
© 2006 American Heart Association *Tampering with this card will alter its appearance.* 80-12

On the front, fill in the circles of the modules *NOT* completed: ●

Course Curriculum completed:

A. Adult First Aid
B. Environmental Emergencies
C. Adult/Child CPR With Mask
D. Adult/Child AED
E. Infant CPR With Mask

ecommended renewal for Heartsaver First Aid is every two years.



Call 911 in case of an emergency

Poison Control Center **1-800-222-1222**

Visit our website: **americanheart.org/cpr**

For traini

Attachment 5

Site Supervisor Training Certificates

ARCADIS

Education
MS, Saf□ty, Univ□rsity of Sout□□rn Ca□ifornia, Los Ang□□s, CA, 1992
BA, Po□itica□Sci□nc□, Univ□rsity of Co□orado, Bou□d□r, CO, 1982

Years of Experience
Tota□ + 28
Wit□ ARCADIS - □

Professional Registrations
C□rtifi□d Saf□ty Prof□ssiona□, sinc□ 2001

Professional Associations
Am□rican Soci□ty of Saf□ty Engin□□rs

Chuck P. Webster, CSP

Environment Division LPS and Compliance Assurance

Mr. W□□st□r □as mor□ t□an 1□ y□ars of □□□□ri□nc□ in □nvironm□nta□□a□t□ and saf□ty as w□□as anot□□r 11 y□ars of □□□□ri□nc□ wor□ing wit□ t□□ mi□itary. His r□s□onsi□i□iti□s □av□ inc□ud□d cor□orat□ □□a□t□ and saf□ty manag□m□nt, contractor □□a□t□ and saf□ty monitoring, conducting EHS training, and managing EHS functions for t□□ contractor tas□□d wit□ t□□ Wor□d Trad□ C□nt□r d□□ris r□mova□.

Mr. W□□st□r is curr□nt□y t□□ □nvironm□nt division Loss Pr□v□ntion Syst□m and Com□ianc□ Assuranc□ Manag□r, r□s□onsi□□□ for st□wards□i□ of t□□ ARCADIS □□□avior-□as□d saf□ty □rogram as w□□as va□idating saf□ty □ractic□s via audits and sit□ visits. Pr□viousy Mr. W□□st□r s□rv□d as t□□ cor□orat□ □□a□t□ and saf□ty manag□r r□s□onsi□□□ for st□wards□i□ of t□□ ARCADIS □□a□t□ and saf□ty □rogram. H□ □rovid□d guidanc□ and training for initia□ro□out of t□□ Loss Pr□v□ntion Syst□m (□□□avior-□as□d saf□ty) t□roug□out ARCADIS. Mr. W□□st□r a□so □rovid□s □□a□t□ and saf□ty su□□ort dir□ct□y to t□n of our □arg□r c□i□nt t□ams.

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2005, Project Cost: $73,365

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2004, Project Cost: $16,941,367

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2002, Project Cost: $600,000

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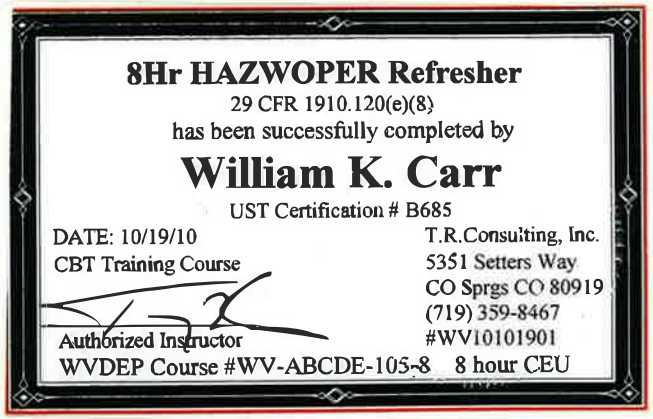


8Hr HAZWOPER Refresher

29 CFR 1910.120(e)(8)

has been successfully completed by

William K. Carr

UST Certification # B685

DATE: 10/19/10

CBT Training Course

Authorized Instructor

T.R.Consulting, Inc.
5351 Setters Way
CO Sprgs CO 80919
(719) 359-8467
#WV10101901

WVDEP Course #WV-ABCDE-105-8 8 hour CEU

04/26/2007 15:15 804-798-5907 MM&A RICHMOND PAGE 01/01
123456789 Line 1 10:54:42 04-26-2007 2/2

Certificate of Training

This Document Certifies That

Keith Carr

HAS SUCCESSFULLY COMPLETED THE OSHA REQUIRED

40 HOUR

HEALTH AND SAFETY TRAINING

COMPLYING WITH OSHA STANDARD

29 CFR 1910 . 120

HAZCOM

INTERNATIONAL INC

Patrick T. Houston CET,ASP

PROGRAM DIRECTOR

CERTIFICATE #: 1921

8/14/97

DATE OF COMPLETION

OSHA Occupational Safety and Health Administration

36-003234994

This card acknowledges that the recipient has successfully completed a 10-hour Occupational Safety and Health Training Course in

Construction Safety and Health

Keith Carr

RICK GLEASON, CIH, CSP

(Trainer name – print or type)

10/26/2009

(Course end date)

GEORGIA BRANCH

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA

SKILL RESPONSIBILITY INTEGRITY

CERTIFICATE OF COMPLETION

This is to certify that

GABE SMITH

has successfully completed the
Georgia Branch, AGC - sponsored education program

OSHA 30-HOUR CONSTRUCTION OUTREACH COURSE

and has been awarded this certificate in recognition of this effort and accomplishment

Awarded this **27th** day of **OCTOBER 2005**

Executive Vice President
Georgia Branch,
Associated General Contractors of America

Richard Dean
Course Instructor

GEORGIA BRANCH

SKILL · RESPONSIBILITY · INTEGRITY

CERTIFICATE OF COMPLETION

This is to certify that

WAYNE HARPER

has successfully completed the
Georgia Branch, AGC - sponsored education program

OSHA 30-HOUR CONSTRUCTION OUTREACH COURSE

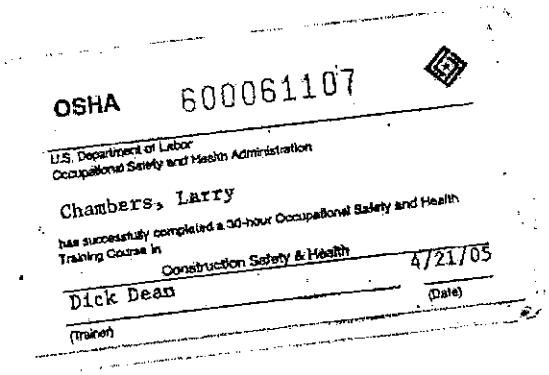
and has been awarded this certificate in recognition of this effort and accomplishment

Awarded this 28th day of JULY 2005

Executive Vice President
Georgia Branch,
Associated General Contractors of America

Richard Dean

Course Instructor



OSHA 600061107

U.S. Department of Labor
Occupational Safety and Health Administration

Chambers, Larry

has successfully completed a 30-hour Occupational Safety and Health Training Course in

Construction Safety & Health

Dick Dean (Trainer)

4/21/05 (Date)

OSHA 600127352

U.S. Department of Labor
Occupational Safety and Health Administration

Rudy Castillo

has successfully completed a 30-hour Occupational Safety and Health Training Course in

Construction Safety & Health

Dick Dean — 10/19/06

(Trainer) (Date)

INSTITUTE FOR ENVIRONMENTAL EDUCATION, INC.

16 Upton Drive Wilmington, MA 01887
PHONE (978) 658-5272

IEE IEE

This is to certify that

Kevin A Hardy

has completed the requisite training, and has passed an examination for accreditation

Asbestos Project Monitor

pursuant to Title II of the Toxic Substance Control Act, 15 U.S.C. 2646

June 11, 2010
Examination Date

10-4726-173-212846
Certificate Number

June 7-11, 2010
Course Dates

Course Location
Institute for Environmental Education
16 Upton Drive
Wilmington, MA 01887

June 11, 2011
Expiration Date

Training Director

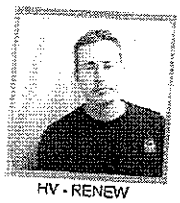
Commonwealth of Massachusetts
Division of Occupational Safety
Heather E. Rowe, Acting Commissioner

Asbestos Project Monitor

KEVIN A. HARDY

Eff. Date 09/08/10
Exp. Date 09/07/11
AM034591
Member of C.O.N.E.S.
HV

11



HV - RENEW

R.I. Analytical

Specialists in Environmental Services

DAVID A. FORRAND

successfully completed the course and examination for

Project Monitor Refresher (8 hrs)

In Compliance with Requirements of MA 453CMR6.10 and TSCA Title II MAP
which meets the requirements of USEPA AHERA 40 CFR 763

96%	11/01/2010
Exam Grade	Date of Exam
MA101081	11/01/2011
Certificate Number	Expiration Date
11/01/2010	11/01/2010
Start of course	End of course

Alfred J. Cabral
Technical Director
R.I. Analytical 40 Illinois Avenue Warwick, RI.02888
Tel: 401-737-8500 Email: ACabral@RIAnalytical.com

COURSE LOCATION: Holiday Inn 31 Hampshire Street Mansfield MA

A·I·E·H·A

American Indian Environment and Health Association

LEAD TRAINING DIVISION

Certificate # 7ME05210802EDER001

This is to certify that

David A. Forrand

194 FORBES ROAD

BRAINTREE, MA 02184

has on 05/21/2008, in Tampa, FL
completed an

EPA Model Lead Risk Assessor Refresher Course

on 05/21/2008 - 05/21/2008 and passed the associated examination on 05/21/2008
with a score of 70% or better

Robert W. Brooks

Instructor
Robert Brooks

President
Thomas Bradford Mayhew

Soc. Sec#: XXX-XX-7851
Accrediation Expires:5/21/11

A·I·E·H·A

American Indian Environment and Health Association

LEAD TRAINING DIVISION

Certificate # 7ME05200802EDIR001

This is to certify that

David A. Forrand

194 FORBES ROAD

BRAINTREE, MA 02184

has on 05/20/2008, in Tampa, FL
completed an

EPA Model Lead Inspector Refresher Course

on 05/20/2008 - 05/20/2008 and passed the associated examination on 05/20/2008
with a score of 70% or better

Robert W. Brooks

Instructor
Robert Brooks

President
Thomas Bradford Mayhew

Soc. Sec#: XXX-XX-7851
Accrediation Expires:5/20/11

AIEHA - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382

Attachment 6

Asbestos Abatement Training Certificates

Radford Individual Certifications

1. Gabriel Smith
2. Larry Chambers
3. Lafontant Joubert
4. Shawn Alewine
5. Remilas Toussaint
6. Jonathan McCard
7. Lilian Osorio
8. Javier Ruiz
9. Fernando Fuentes
10. Justin Eliassaint
11. Herne Jacob
12. Raul Chow
13. Ted Fagoth
14. Moises Saavedra
15. Maxwell White
16. Jasser Chang
17. Shirley Flores
18. Samuel Escorcia
19. Francisco Rubio
20. Belter Marroquin
21. Michlete Joesph
22. Jonas Joesph
23. Michael Cox Jr.
24. Figueroa Patterson
25. Wayne Harper
26. Michael Domeix
27. Rudy Castillo
28. Ramon Irias

M·E·T·A

Mayhew Environmental Training Associates

INCORPORATED

Certificate # 7ME05211001ASR0001

This is to certify that

Gabriel F. Smith

has on 05/21/2010, in Norcross, GA
completed the requirements for asbestos accreditation under Section 206 of TSCA Title II, 15 U.S.C. 2646

AHERA Asbestos Supervisor Refresher Course

as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)
on 05/21/2010 - 05/21/2010 and passed the associated examination on 05/21/2010
with a score of 70% or better
CM = 0.00 Pts.

KANSAS EST. 1985 MAYHEW INC. 1987 ENVIRONMENTAL TRAINING ASSOCIATES SAFETY IN GOD ALONE

Instructor
Dean Althage

Accreditation Expires: 5/21/11

President
Thomas Bradford Mayhew

M E T A - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382

RESPIRATOR QUALITATIVE FIT TEST

NAME: Gabriel F Smith

SOC. SEC. NO.: 9275

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: RF Flores (Name) 02-12-10 (Date)

Expiration Date: 02-12-11

Clairmont Medical Clinic

Two thousand eight. CMC

Respiratory Clearance

Name GABRIEL SMITH

Social Security Number XXX-XX-9275

Company Name _____

Job Title _____

Exam Date AUGUST 23, 2008.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE 8/23/2008. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined GABRIEL SMITH whose Social Security Number is XXX-XX-9275 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand eight).**

Signed Y. Belachew Date AUGUST 23, 2008.
Examining Physician

NB: Please don't accept if it is not original

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Asbestos Consulting & Training Systems

38825.6896CERT/SR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Larry Chambers

XXX-XX-5553

2734 Ethridge Mill RD , Griffin,GA

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

6-Apr-10 TO 6-Apr-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006271.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 04/06/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E, OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED

James F. Stump, Course Sponsor

Certificate Number..... 139246

This Certificate Expires:

OSHA TRAINING: 6-Apr-11

04/06/11

6-Apr-11

Course Number GE1014

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: R. LARRY CHAMBERS

SOC. SEC. NO.: 5553

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Roy Larry Jr Chambers

Social Security Number XXX-XX-5553

Company Name _____

Job Title _____

Exam Date September/13/2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE SEPTEMBER /13/2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Roy Larry Jr Chambers whose Social Security Number is XXX-XX 5553 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date September /13/.2010
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

39031.4572CERT/SR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Lafontant Joubert

XXX-XX-8074

3350 Green Point Prwy , Norcross,GA

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

29-Oct-10 TO 29-Oct-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006271.

NDAAC Provider #451 Trainer(s): Jim Stump

TEST SCORE: 92 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA, 30340

Successful course completion based on exam score on: 10/29/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2616), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE IV OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E, OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 145671

This Certificate Expires:

OSHA TRAINING: 29-Oct-11

10/29/11

29-Oct-11

Course Number GE1043

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Lafontant Joubert

SOC. SEC. NO.: 8074

DIVISION: EBU - (ABATEMENT)

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 07-26-10

Name Date

Expiration Date: 07-26-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name LAFONTANT JOUBERT

Social Security Number XXX-XX-8074

Company Name _____

Job Title _____

Exam Date FEBRUARY 09, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE FEBRUARY 09, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined LAFONTANT JOUBERT whose Social Security Number is XXX-XX-8074 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date FEBRUARY 09, 2010.
Examining Physician

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38825.6897CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Shawn L. Alewine

XXX-XX-4187

73 Elm ST , Griffin,GA

has successfully completed an English

Asbestos Worker Refresher

9-Apr-10 TO 9-Apr-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 04/09/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 139247

This Certificate Expires:

9-Apr-11 04/09/11

Course Number GE1014

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: SHAWN ALEWINE

SOC. SEC. NO.: 4187

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium _____ Large ✓

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-11

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. ~~CME~~

Respiratory Clearance

Name SHAWN LADELL ALEWINE

Social Security Number XXX-XX-4187

Company Name _____

Job Title _____

Exam Date MARCH 09, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE MARCH 09, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined SHAWN LADELL ALEWINE whose Social Security Number is XXX-XX-4187 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date MARCH 09, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

39031.4579CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Remilus Toussaint

XXX-XX-9186

4719 Ryan Rd , Conley ,GA

has successfully completed an English

Asbestos Worker Refresher

30-Oct-10 TO 30-Oct-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

NDAAC Provider #451 Trainer(s): Jim Stump

TEST SCORE: 72 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA, 30340

Successful course completion based on exam score on: 10/30/10

This Certificate Expires:

30-Oct-11 10/30/11

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E, AS APPROPRIATE FEDERAL, STATE OR LOCAL REGULATIONS, AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 145675

Course Number GE1043

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: REMILUS TOUSSAINT

SOC. SEC. NO.: 9186

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium _____ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand nine. CMC

Respiratory Clearance

Name REMILUS TOSSAINT

Social Security Number###-##-9186

Company Name _____

Job Title _____

Exam Date 11-30-2009

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE NOVEMBER 30, 2009. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined REMILUS TOUSSAINT whose Social Security Number is###-##-9186 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand nine).**

Signed Y. Belachew Date 11-30-2009
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38954.6928CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Jonathan A. McCard

XXX-XX-2026

389 Oak Ridge DR., Thomaston,GA

has successfully completed an English

Asbestos Worker Refresher

23-Aug-10 TO 23-Aug-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 08/23/10

This Certificate Expires:

23-Aug-11 08/23/11

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE 'TOXIC SUBSTANCES CONTROL ACT', 40 CFR PART 763 OR ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS AS AMENDED

James F. Stump, Course Sponsor

Certificate Number..... 144149

Course Number GE1034

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: JONATHAN M'COND

SOC. SEC. NO.: 2026

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying ✓

Size: Small _____ Medium _____ Large ✓

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Jonathan Allen McCard

Social Security Number XXX-XX-2026

Company Name Winter Environmental

Job Title

Exam Date August 04, 2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE August 04, 2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Jonathan Allen McCard whose Social Security Number is XXX-XX-2026 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belnchew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date August 04, 2010.
Examining Physician

NB: Please don't accept if it is not original

MSK Ambiental

38840.679CERT/LWR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Lilian Juarez Osorio

XXX-XX-7333

750 Avalon Forest Dr , Lawrenceville,GA 30044

has successfully completed a Spanish

Asbestos Worker Refresher

24-Apr-10 TO 24-Apr-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

Trainer(s): Alberto G. Ania

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score.

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENT OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE MEETS THE APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763, OR 763 APPENDIX C, ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

24-Apr-11 04/24/11

Certificate Number..... 140326

Course Number GS1016

USEPA's actual expiration date will appear on individual's license. See individual state rules for actual state expiration date.

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Lilian Osorio Juarez

SOC. SEC. NO.: 3186

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith 3/20/10
Name Date

Expiration Date: 3/20/10

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name LILIAN O JUAREZ

Social Security Number XXX-XX-7333

Company Name _____

Job Title _____

Exam Date MAY 22, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE MAY 22, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined LILIAN O JUAREZ whose Social Security Number is XXX-XX-7333 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date MAY 22, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38931.6233CERT/S

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Javier D. Ruiz

XXX-XX-4899

5893 Rue Villa LN., Tucker, GA

has successfully completed an English

Asbestos Contractor/Supervisor Course

15-Mar-10 TO 19-Mar-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0901020/CN-000627.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 03/19/10

UNDER STATE AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE WAS FULLY APPLICABLE REQUIREMENTS OF TRUTH IN THE "TOWN" INSTANCES CONTRACT", 40 CFR PART 763 OR TSCA TITLE II AND APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

OSHA TRAINING: 19-Mar-11

19-Mar-11 03/19/11

Certificate Number..... 143670

Course Number GE1011

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Javier Ruiz

SOC. SEC. NO.: 4899

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith 3/4/10
Name Date

Expiration Date: 3/4/10

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name JAVIER RUIZ

Social Security Number XXX-XX-4899

Company Name _____

Job Title _____

Exam Date OCTOBER 05, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE OCTOBER 05, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined JAVIER RUIZ whose Social Security Number is XXX-XX-4899 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date OCTOBER 05, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38784.5781CERT/LWR5

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Fernando Jose Fuentes

XXX-XX-6454

1080 Kibbe Circle , Lawrenceville,GA

has successfully completed a Spanish

Asbestos Worker Refresher

26-Feb-10 TO 26-Feb-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

NDAAC Provider #1119 Trainer(s): Alberto G. Ania

Training Address: 5991 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 02/26/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E, WHEN APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

26-Feb-11 02/26/11

Certificate Number..... 137682

Course Number GS1008

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: FERNANDO FUENTES

SOC. SEC. NO.: 6454

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name FERNANDO FUENTES

Social Security Number XXX-XX-6454

Company Name _____

Job Title _____

Exam Date FEBRUARY 23, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE FEBRUARY 23, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined FERNANDO FUENTES whose Social Security Number is XXX-XX-6454 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date FEBRUARY 23, 2010.
Examining Physician

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38822.5562CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Justin Eliassaint

XXX-XX-8222

3101 Snapfinger CT , Decatur,GA

has successfully completed an English

Asbestos Worker Refresher

27-Mar-10 TO 27-Mar-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

NDAAC Provider #451 Trainer(s): Jim Stump

TEST SCORE: 80 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 03/27/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 139198

This Certificate Expires:

27-Mar-11 03/27/11

Course Number GE1012

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: ELIassaint Justin

SOC. SEC. NO.: 8222

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith (Name) 9/7/10 (Date)

Expiration Date: 9/7/11

RESPIRATOR QUALITATIVE FIT TEST

NAME: ELIassaint Justin

SOC. SEC. NO.: 8222

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith (Name) 9/7/10 (Date)

Expiration Date: 9/7/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name JUSTIN ELIASSAINT

Social Security Number ###-##-8222

Company Name _____

Job Title _____

Exam Date 02-19-2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE 02-19-2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined JUSTIN ELIASSAINT whose Social Security Number is ###-##-8222 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date 02-19-2010
Examining Physician

NB: Please don't accept if it is not original

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Asbestos Consulting & Training Systems

38966.5453CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Herne Jacob

XXX-XX-6880

4103 Wesley Club DR #117 , Decatur,GA

has successfully completed an English

Asbestos Worker Refresher

23-Aug-10 TO 23-Aug-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 08/23/10

This Certificate Expires:

23-Aug-11 08/23/11

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 APPENDIX C AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS, AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 144328

Course Number GE1034

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Herne Jacob

SOC. SEC. NO.: 6880

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith (Name) 9/7/10 (Date)

Expiration Date: 9/7/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name JACOB HERNE

Social Security Number XXX-XX-6880

Company Name

Job Title

Exam Date August 24,2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE AUGUST . 24 2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined JACOB HERNE whose Social Security Number is XXX-XX 6880 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date August 24, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38749.688CERT/LWR5

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Raul Chow

XXX-XX-3557

965D Carla PL , Norcross,GA

has successfully completed a Spanish

Asbestos Worker Refresher

22-Jan-10 TO 22-Jan-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

NDAAC Provider #1119 Trainer(s): Adan L. Rivera

Training Address: 5991 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 01/22/10

UNDER PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE WAS HELD IN COMPLIANCE WITH APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 APPENDIX C AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

22-Jan-11 01/22/11

Certificate Number..... 136894

Course Number GS1003

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Raul Chow

SOC. SEC. NO.: 3557

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Marlin Twitz (Name) 5-05-10 (Date)

Expiration Date: 5-05-10

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name RAUL CHOW

Social Security Number XXX-XX-3557

Company Name _____

Job Title _____

Exam Date JANUARY NINETEEN TWO THOUSAND TEN.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: None

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE JANUARY 19, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined RAUL CHOW whose Social Security Number is XXX-XX-3557 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date JANUARY 19, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38952.5362CERT/LWR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Ted C. Fagoth

XXX-XX-0413

420 Heathgate Dr., Lawrenceville,GA 30044

has successfully completed a Spanish

Asbestos Worker Refresher

20-Aug-10 TO 20-Aug-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

Trainer(s): Alberto G. Ania

TEST SCORE: 96 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score. **20-Aug-10**

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE IS IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 765, AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

20-Aug-11 08/20/11

Certificate Number..... 144099

Course Number GS1033

USEPA's actual expiration date will appear on individual's license. See individual state rules for actual state expiration date.

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Ted Faggoth

SOC. SEC. NO.: 0413

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith _____ 8/20/10

Name Date

Expiration Date: 8/20/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name TED C FAGOTH

Social Security Number XXX-XX-0413

Company Name

Job Title

Exam Date September/04/2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).

◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE SEPTEMBER /04/2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined TED C FAGOTH whose Social Security Number is XXX-XX 0413 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date September /04/.2010
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38898.7359CERT/LW

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Moises A. Saavedra

XXX-XX-8275

2900 32 St , Miami,FL

has successfully completed a Spanish

Asbestos Worker Course

28-Jun-10 TO 1-Jul-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Compiles with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006284.

NDAAC Provider #1119 Trainer(s): Alberto G. Ania

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 07/01/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E, OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

1-Jul-11 07/01/11

Certificate Number..... 142941

Course Number GS1026

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LITHO. IN U.S.A.

WINTER ENVIRONMENTAL

RESPIRATOR QUALITATIVE FIT TEST

NAME: Moises A. Saavedra

SOC. SEC. NO.: 8275

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand 7700 North Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7/1/10

Name Date

Expiration Date: 7/1/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name SAAVEDRA MOISES ANTONIO

Social Security Number XXX-XX-8275

Company Name _____

Job Title _____

Exam Date July 05, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE July 05, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined SAAVEDRA MOISES ANTONIO whose Social Security Number is XXX-XX-8275 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten)**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date July 05, 2010.
Examining Physician

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38898.7357CERT/W

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Maxwell D. White

XXX-XX-2743

1160 Adams Ferry , Thomaston,GA

has successfully completed an English

Asbestos Worker Course

28-Jun-10 TO 1-Jul-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006268.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 07/01/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2616), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE IV OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

07/01/11

1-Jul-11

Certificate Number..... 142939

Course Number GE1026

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LITHO. IN U.S.A.

WINTER ENVIRONMENTAL

RESPIRATOR QUALITATIVE FIT TEST

NAME: Maxwell D. White

SOC. SEC. NO.: 2743

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7/1/10

Name Date

Expiration Date: 7/1/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name WHITE MAXWELL DYLAN

Social Security Number XXX-XX-2743

Company Name _____

Job Title _____

Exam Date July 05, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE July 05. 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined WHITE MAXWELL DYLAN whose Social Security Number is XXX-XX-2743 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date July 05, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38898.736CERT/LW

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Jasser Chang

XXX-XX-9484

122 Sadler Dr , Douglasville,GA

has successfully completed a Spanish

Asbestos Worker Course

28-Jun-10 TO 1-Jul-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006284.

NDAAC Provider #1119 Trainer(s): Alberto G. Ania

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 07/01/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH THE APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 APPENDIX C, AS AMENDED AND APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 142942

This Certificate Expires:

1-Jul-11 07/01/11

Course Number GS1026

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LITHO. IN U.S.A.

WINTER ENVIRONMENTAL

RESPIRATOR QUALITATIVE FIT TEST

NAME: Jasser Chang

SOC. SEC. NO.: 9484

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7/1/16
Name Date

Expiration Date: 7/1/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Chang Jasser

Social Security Number XXX-XX-9484

Company Name _____

Job Title _____

Exam Date July 05, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE July 05, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Chang Jasser whose Social Security Number is XXX-XX-9484 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. (Issued two thousand ten)

Signed Y. Belachew Date July 05, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38769.6669CERT/LWR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Shirley M. Flores

XXX-XX-2884

6864 Mimosa CRL , Tucker,GA

has successfully completed a Spanish

Asbestos Worker Refresher

6-Feb-10 TO 6-Feb-10

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

Trainer(s): Adan L. Rivera

Training Address: 5991 New Peachtree RD Suite 122, Atlanta, GA 30340

###

James F. Stump, Course Sponsor

This Certificate Expires:

6-Feb-11 02/06/11

Certificate Number..... 137264

Course Number GS1005

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LITHO. IN U.S.A.

WINTER ENVIRONMENTAL

RESPIRATOR QUALITATIVE FIT TEST

NAME: Shirley M. Flores

SOC. SEC. NO.: 2884

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: ____

Respirator: Brand 7700 North Respirator

Half face, air purifying ✓ Full face, air purifying ____

Size: Small ____ Medium ✓ Large ____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: [signature] 7/1/10

Name Date

Expiration Date: 7/1/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name SHIRLEY MULLER FLORES

Social Security Number -2884

Company Name _____

Job Title _____

Exam Date MARCH 05, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE MARCH 05, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined SHIRLEY MULLER FLORES whose Social Security Number is XXX-XX-2884 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☐is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date MARCH 05, 2010.
Examining Physician

NB: Please don't accept if it is not original

MSK Ambiental

38769.667CERT/LWR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Samuel Escorcia

XXX-XX-9716

1042 Gunners Walk , Tucker,GA

has successfully completed a Spanish

Asbestos Worker Refresher

6-Feb-10 TO 6-Feb-10

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

Trainer(s): Adan L. Rivera

Training Address: 5991 New Peachtree RD Suite 122, Atlanta, GA 30340

###

James F. Stump, Course Sponsor

This Certificate Expires:

6-Feb-11 02/06/11

Certificate Number..... 137265

Course Number GS1005

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: SAMUEL ESCORCIA

SOC. SEC. NO.: 9716

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH. 7700-SERIES

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: MARTIN LUIZ (Name) 10-11-10 (Date)

Expiration Date: 10-11-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name SAMUEL ESCORCIA

Social Security Number XXX-XX-9716

Company Name _____

Job Title _____

Exam Date FEBRUARY 27, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE FEBRUARY 27, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined SAMUEL ESCORCIA whose Social Security Number is XXX-XX-9716 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date FEBRUARY 27, 2010.
Examining Physician

NB: Please don't accept if it is not original

MSK Ambiental

38952.536CERT/LWR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Francisco J. Rubio

X X X – X X – 5 2 3 Ø

1243 Blazing Ridge way , Lawrenceville,GA 30045

has successfully completed a Spanish

Asbestos Worker Refresher

21-Aug-10 TO 21-Aug-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

Trainer(s): Alberto G. Ania

TEST SCORE: 96 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score. 21-Aug-10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENT OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE MEETS WITH ALL APPLICABLE REQUIREMENTS OF TITLE 40 CFR PART 763 OR 763 "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

21-Aug-11 Ø 8 / 2 1 / 1 1

Certificate Number..... 1 4 4 Ø 9 7

Course Number GS1033

USEPA's actual expiration date will appear on individual's license. See individual state rules for actual state expiration date.

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Francisco Rubio

SOC. SEC. NO.: 5230

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North Y a face respirator 7700 Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith _____ 8/21/10
Name Date

Expiration Date: 8/21/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name FRANCISCO JAVIER RUBIO

Social Security Number XXX-XX-5230

Company Name _____

Job Title _____

Exam Date SEPTEMBER 21, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE 09/21/2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined FRANCISCO JAVIER RUBIO whose Social Security Number is XXX-XX-5230 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date SEPTEMBER 21, 2010
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone 404-477-1218

NB: Please don't accept if it is not original

MSK Ambiental

38952.5361CERT/LWR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Belter O. Marroquin

XXX-XX-6713

3408 Rolling Ridge , Lawrenceville,GA 30044

has successfully completed a Spanish

Asbestos Worker Refresher

21-Aug-10 TO 21-Aug-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Complies with Sec. 206 TSCA 15 USC 2646 and FL49-0003092/CN-0006285.

Trainer(s): Alberto G. Ania

TEST SCORE: 84 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score. 21-Aug-10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENT OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE MEETS WITH ALL APPLICABLE REQUIREMENTS OF TITLE IV OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS AS AMENDED

James F. Stump, Course Sponsor

This Certificate Expires:

21-Aug-11

08/21/11

Certificate Number..... 144098

Course Number GS1033

USEPA's actual expiration date will appear on individual's license. See individual state rules for actual state expiration date.

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: BELTEN MANNSIN

SOC. SEC. NO.: 6713

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic Two thousand ten. CMC

Respiratory Clearance

Name BELTER O MARROQUIN

Social Security Number XXX-XX-6713

Company Name _____

Job Title _____

Exam Date APRIL 09, 2010.

Incompliance with 29 CRF 1910.134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NINE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE APRIL 09, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined BELTER O MARROQUIN whose Social Security Number is XXX-XX-6713 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date APRIL 09, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38811.6895CERT/SR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Michelet Joseph

XXX-XX-0933

4576 Tudor Castle Dr , Decatur,GA

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

19-Mar-10 TO 19-Mar-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006271.

NDAAC Provider #451 Trainer(s): Jim Stump

TEST SCORE: 80 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 03/19/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR THE APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 138685

This Certificate Expires:

OSHA TRAINING: 19-Mar-11 03/19/11

19-Mar-11

Course Number GE1011

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Michelet Joseph

SOC. SEC. NO.: 0933

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series
Half face, air purifying ✓ Full face, air purifying _____
Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Libio Keller (Name) 10-14-10 (Date)

Expiration Date: 10-14-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Michelet Joseph

Social Security Number XXX-XX-0933

Company Name Winter Environmental

Job Title

Exam Date August 04, 2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE August 04, 2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Michelet Joseph whose Social Security Number is XXX-XX-0933 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date August 04, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38962.6468CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Jonas Joseph

XXX-XX-1590

4576 Tudor Castle Dr , Decatur,GA

has successfully completed an English

Asbestos Worker Refresher

20-Aug-10 TO 20-Aug-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 08/20/10

This Certificate Expires:

20-Aug-11 08/20/11

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE MEETS THE APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR THE EPA APPROVED STATE APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS, AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 144300

Course Number GE1033

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: JONAS JOSEPH

SOC. SEC. NO.: 1592

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium _____ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-12

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Jonas Joseph

Social Security Number XXX-XX-1590

Company Name _____

Job Title _____

Exam Date September /25/ 2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE SEPTEMBER// 25/2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Jonas Joseph whose Social Security Number is XXX-XX 1590 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date September /25/.2010
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38840.6742CERT/WR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Michael Cox, Jr.

XXX-XX-8528

112 Honey Bear Dr , Griffin,GA 30223

has successfully completed an English

Asbestos Worker Refresher

1-May-10 TO 1-May-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006269.

Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score.

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENT OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE IV, SUBPART F, "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E, OTHER APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

1-May-11 05/01/11

Certificate Number..... 140239

Course Number GE1017

USEPA's actual expiration date will appear on individual's license. See individual state rules for actual state expiration date.

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: MICHAEL COX

SOC. SEC. NO.: 8588

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium _____ Large ✓

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Michael Anthony Jr Cox

Social Security Number XXX-XX-8528

Company Name Winter Environmental

Job Title

Exam Date August 06, 2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).

◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE August 06, 2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Michael Anthony Jr cox whose Social Security Number is XXX-XX-8528 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date August 06, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38755.6666CERT/SR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Figueroa L. Patterson

XXX-XX-3003

1774 La Mancha DR , Lawrenceville,GA

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

2-Feb-10 TO 2-Feb-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006271.

NDAAC Provider #451 Trainer(s): Jim Stump

Training Address: 5991 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 02/02/10

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763, OR THE EQUIVALENT UNDER APPROPRIATE FEDERAL, STATE OR LOCAL REGULATIONS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

OSHA TRAINING: 2-Feb-11

2-Feb-11 02/02/11

Certificate Number..... 136959

Course Number GE1005

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: FIGUEROA PATTERSON

SOC. SEC. NO.: 3003

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium _____ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10

Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Figueroa Lewis Patterson

Social Security Number XXX-XX-3003

Company Name

Job Title

Exam Date July 16, 2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE July 16, 2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Figueroa Lewis Patterson whose Social Security Number is XXX-XX-3003 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date July 16, 2010.
Examining Physician

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38840.6747CERT/SR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954)524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Wayne Harper

XXX-XX-3459

73 Elm ST , Griffin,GA 30223

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

1-May-10 TO 1-May-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006271.

Trainer(s): Jim Stump

Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score.

UNDER CIVIL AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENT OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763, OR 29 CFR 1926.1101, OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS, AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

OSHA DATE: **1-May-11**

1-May-11

05/01/11

Certificate Number..... 140323

Course Number **GE1017**

USEPA's actual expiration date will appear on individual's license. See individual state rules for actual state expiration date.

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: WAYNE HARPER

SOC. SEC. NO.: 3459

DIVISION: ABATEMENT

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand NORTH 7700 SERIES

Half face, air purifying _____ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: _____ 7-28-10
Name Date

Expiration Date: 7-28-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name Tyrone Wayne Harper

Social Security Number XXX-XX-3459

Company Name Winter Environmental

Job Title

Exam Date August 06, 2010

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended

Recommended follow up ONE YEAR

Physician Signature Y. Belachew

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE August 06, 2010 AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined Tyrone Wayne Harper whose Social Security Number is XXX-XX-3459 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No but quit 19 years ago.

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date August 06, 2010.
Examining Physician

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

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900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Michael M. Domeiz

XXX-XX-6717

4105 Howell Park Rd. , Duluth,GA

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

18-Sep-10 TO 18-Sep-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-0006271.

NDAAC Provider #451 Trainer(s): Jim Stump

TEST SCORE: 76 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 09/18/10

UNDER PENALTIES AND CRIMINAL PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COURSE IS IN FULL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR 763 SUBPART E AND ANY APPROPRIATE FEDERAL, STATE OR LOCAL REQUIREMENTS AS AMENDED.

James F. Stump, Course Sponsor

Certificate Number..... 144786

This Certificate Expires:

OSHA TRAINING: 18-Sep-11

18-Sep-11

09/18/11

Course Number GE1037

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LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Michael Muller Domeiz

SOC. SEC. NO.: 6717

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand North 7700 Series
Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Libio Muller D. (Name) 01-20-2010 (Date)

Expiration Date: 01-20-2011

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name MICHAEL MULLER-DOMEIZ

Social Security Number XXX-XX-6717

Company Name _____

Job Title _____

Exam Date OCTOBER 06, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Bellaneu M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Bellaneh, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE OCTOBER 06, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined MICHAEL MULLER-DOMEIZ whose Social Security Number is XXX-XX-6717 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date OCTOBER 06, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

M·E·T·A

Mayhew Environmental Training Associates

INCORPORATED

Certificate # 7ME05211001ASR0013

This is to certify that

Rudy A. Castillo

has on 05/21/2010, in Norcross, GA
completed the requirements for asbestos accreditation under Section 206 of TSCA Title II, 15 U.S.C. 2646

AHERA Asbestos Supervisor Refresher Course

as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)
on 05/21/2010 - 05/21/2010 and passed the associated examination on 05/21/2010
with a score of 70% or better
CM = 0.00 Pts.

KANSAS MAYHEW EST. 1985 INC. 1987 ENVIRONMENTAL TRAINING ASSOCIATES SAFETY IN GOD ALONE

Instructor
Dean Althage

Accreditation Expires: 5/21/11

President
Thomas Bradford Mayhew

M E T A - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382

RESPIRATOR QUALITATIVE FIT TEST

NAME: Rudy A Castillo

SOC. SEC. NO.: 8054

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand 7700 Series. North

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓
2) apply negative pressure ✓
3) apply positive pressure ✓
4) gross leak check ✓
5) breathe normally ✓
6) breathe deeply ✓
7) turn head ✓
8) nod head ✓
9) repeat passage ✓
10) jog in place ✓
11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: RF Torres (Name) 02-10-10 (Date)

Expiration Date: 02-10-11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name RUDY CASTILLO

Social Security Number XXX-XX-8054

Company Name _____

Job Title _____

Exam Date FEBRUARY 16, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE FEBRUARY 16, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined RUDY CASTILLO whose Social Security Number is XXX-XX-8054 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☐Yes ☑No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

Signed Y. Belachew Date FEBRUARY 16, 2010.
Examining Physician

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

NB: Please don't accept if it is not original

Asbestos Consulting & Training Systems

38966.5371CERT/SR

900 N.W. 5TH Avenue, Fort Lauderdale, Florida 33311 (954) 524-7208

Processed By:

Seagull

To Authenticate Certificate:
www.seagulltraining.com
1-800-966-9933

This is to Certify that

Ramon A. Irias

XXX-XX-9990

1330 Dickens RD , Lilburn,GA

has successfully completed an English

Asbestos Contractor/Supervisor Refresher

3-Sep-10 TO 3-Sep-10

Individual above has completed the requsite training for accreditation under TSCA Title II

Meets state requirements of 326 IAC (IDEM) and FL49-0001020/CN-000627-1.

NDAAC Provider #451 Trainer(s): Jim Stump

TEST SCORE: 100 % Training Address: 5891 New Peachtree RD Suite 122, Atlanta, GA 30340

Successful course completion based on exam score on: 09/03/10

UNDER PENALTIES OF LAW FOR MAKING OR SUBMISSION OF FALSE OR FRAUDULENT STATEMENTS OR REPRESENTATIONS (18 U.S.C. 1001 AND 15 U.S.C. 2615), I CERTIFY THAT THIS TRAINING COMPLIES WITH ALL APPLICABLE REQUIREMENTS OF TITLE II OF THE "TOXIC SUBSTANCES CONTROL ACT", 40 CFR PART 763 OR TSCA AND ANY OTHER APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS AS AMENDED.

James F. Stump, Course Sponsor

This Certificate Expires:

OSHA TRAINING: 3-Sep-11

09/03/11

3-Sep-11

Certificate Number..... 144324

Course Number GE1035

© 2004 GOES 441

LITHO. IN U.S.A.

RESPIRATOR QUALITATIVE FIT TEST

NAME: Ramon IRias

SOC. SEC. NO.: 9990

DIVISION: Abatement

Method: Irritant Smoke Test ✓ Other: _____

Respirator: Brand 7700 North Series

Half face, air purifying ✓ Full face, air purifying _____

Size: Small _____ Medium ✓ Large _____

Fit Test Procedure:

1) visually inspect ✓	6) breathe deeply ✓
2) apply negative pressure ✓	7) turn head ✓
3) apply positive pressure ✓	8) nod head ✓
4) gross leak check ✓	9) repeat passage ✓
5) breathe normally ✓	10) jog in place ✓
	11) breathe normally ✓

When sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Test given by: Gabe Smith (Name) 9/7/10 (Date)

Expiration Date: 9/7/11

Clairmont Medical Clinic

Two thousand ten. CMC

Respiratory Clearance

Name RAMON A IRIAS ESCOTO Jr.

Social Security Number XXX-XX-9990

Company Name _____

Job Title _____

Exam Date MARCH 05, 2010.

Incompliance with 29 CRF 1910,134, Medical Clearance for the use of respiratory protective equipment is.

- ◆ Class I (unrestricted use of all respirators, including negative Pressure, supplied air and self contained breathing apparatus).
- ◆ Class II (Restricted use of respiratory equipment)

Restriction: NONE

- ◆ Class III (use of respiratory equipment is prohibited).

EXAMINATION FOLLOWUP

No follow up testing is recommended _____

Recommended follow up ONE YEAR

Physician Signature Y. Belachew M.D.

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

PHYSICIANS WRITTEN OPINION
CLAIRMONT MEDICAL CLINIC
3490 CLAIRMONT ROAD ATLANTA GA 30319
404-477-1218

In accordance with the requirements of Section (1) (7) of the OSHA General Industry Asbestos Standard 29CFR 191.1001, and in accordance with the requirements of Section (M) (4) of the OSHA Construction Industry Asbestos Standard, 29CFR 1926.62, the examining physician/clinic does provide the worker with the written opinion containing the following:

THIS IS TO CERTIFY THAT ON THIS DATE MARCH 05, 2010. AND IN ACCORDANCE WITH THE OSHA Asbestos standard 29CFR 1926.1101 AND OSHA LEAD STANDARD 29 CFR 1926.62

I have examined RAMON A IRIAS ESCOTO 51. whose Social Security Number is XXX-XX-9990 and base on my findings, have determined this individual ☑may ☐may not use a respiratory device while performing his/her required Work and ☑is ☐is not capable of working in hot work environment, and close confined areas and/or high places.

2. The result on this examination ☐have ☑have not detected any medical condition which would place the worker at an increased risk of health impairment from exposure to asbestos.

3. The worker ☐has a ☑has no history of occupational incidents. (Brief Details)

4. In accordance with OSHA requirements, I have informed the above named Individual of the results on his/her medical examination and of any medical condition that may result from the exposure to asbestos.

5. The worker has been informed by me of the increases risk of lung cancer attributable to the combined effect of smoking and asbestos exposure. Worker uses tobacco products. ☑Yes ☐No

The complete medical examination report on the above named individual will be forwarded to your company pending final conclusion and interpretation of any medical data collected during the examination. **(Issued two thousand ten).**

CLAIRMONT MEDICAL CLINIC, LLC
Yohannes Belachew, M.D.
3490 Clairmont Road
Atlanta, Georgia 30319
Phone: 404-477-1218

Signed Y. Belachew Date MARCH 05, 2010.
Examining Physician

NB: Please don't accept if it is not original

Attachment 7

Scaffolding and Fall Protection
Training Certificates

CERTIFICATE OF COMPLETION

SCAFFOLD SAFETY TRAINING FOR THE OSHA COMPETENT PERSON

Wayne Harper

Has successfully completed training in 29 CFR 1926.450 - 454, Subpart L, which includes: Identification of scaffold hazards, scaffold inspection, proper frame scaffold erection, OSHA standards pertaining to scaffold use, role & responsibilities of the competent person, safe use of scaffolds, and OSHA scaffold training requirements. Upon successful completion of the final exam he/she is hereby awarded this certificate of completion.

PROSAFE TRAINING INSTITUTE

Philip Greisen, CHST
PROSAFE Solutions, Inc.

November 7th, 2008

SUNBELT
RENTALS

This certifies that

Castillo, Rudy

Of

Winter

has attended the following Scaffolds OSHA Subpart L Safety Training

Scaffold Competent Person

Date: 8/17/2007

Authorized Signature

As holder of this card, I pledge to follow all OSHA standards for the safe use of scaffolds and any other applicable safety guidelines for construction and industry as well as:

1. Use proper base plates, mud sills, and adjustable screw jacks on solid ground for a good, sound foundation
2. Inspect all components and reject damaged parts
3. Use the scaffold for the purpose it is designed
4. Do not exceed the load capacity
5. Erect the scaffold per the manufacturer's directions
6. Ensure the scaffold and its components, including anchorages, are capable of supporting, without failure, at least 4 times the maximum intended load
7. Use scaffold grade planks and higher plank all levels
8. Overlap planks a minimum of 12 inches, and extend planks over their end supports at least 6 inches but not more than 12 inches
9. Use guardrails, toeboards and screens on all open sides and ends of platforms
10. Inspect the scaffold for setup and erection and before each shift and do not remove any part without permission
11. Provide and use proper ladder access to all work levels
12. Don't ride on manually propelled mobile scaffolds

SUNBELT
RENTALS

This certifies that

Smith, Gabriel

Of

Winter

has attended the following Scaffolds OSHA Subpart L Safety Training

Scaffold Competent Person

Date: 8/17/2007

Authorized Signature

As holder of this card, I pledge to follow all OSHA standards for the safe use of scaffolds and any other applicable safety guidelines for construction and industry as well as:

1. Use properly rated planks, mud sills and adjustable screw jacks on solid ground for a good, level foundation.
2. Inspect all components and reject damaged parts.
3. Tie the scaffold to the structure at 4 to 5 vertically and 26 feet horizontally.
4. Do not exceed the 4 to 1 height to maximum base dimension ratio.
5. Erect the scaffolds per the manufacturer's directions.
6. Unless the capacities as given by the manufacturer and remember, scaffolds shall be capable of supporting, without failure, at least 4 times the maximum intended load.
7. Use scaffold grade plank and tightly plank all levels.
8. Overlap planks a minimum of 12 inches and extend planks over bars and support at least 6 inches but not more than 12 inches.
9. Use guardrails, midrails and toeboards on all open sides and ends of platforms.
10. Inspect the scaffolds setup after erection and before each shift and do not remove any part without permission.
11. Provide and use proper ladder access to all work levels.
12. Don't ride on improperly propelled mobile scaffolds.

SUNBELT
RENTALS

This certifies that

Chambers, Larry

Of

Winter

has attended the following Scaffolds OSHA Subpart L Safety Training

Scaffold Competent Person

Date: 8/17/2007

Authorized Signature

As holder of this card, I pledge to follow all OSHA standards for the safe use of scaffolds and any other applicable safety guidelines for construction and industry as well as:

1. Use proper base plates, wood sills and adjustable screw jacks on solid ground or a good, sound foundation.
2. Inspect all equipment and reject damaged parts.
3. Tie the scaffold to the structure at 4 to 1 vertically and 30 feet horizontally.
4. Do not extend the 4 to 1 height to maximum base dimension limit.
5. Assure the scaffold per the manufacturer's instructions.
6. Follow the capacities as given by the manufacturer and, in the absence, scaffolds shall be capable of supporting without failure, at least 4 times the maximum intended load.
7. Use scaffold grade planks and safety planks all levels.
8. Overlap planks a minimum of 12 inches and extend planks over end supports at least 6 inches but not more than 12 inches.
9. Use guardrails, midrails and toeboards on all open sides and ends of platforms.
10. Inspect the scaffolds's setup after erection and before each shift and do not remove any part without permission.
11. Provide and use proper ladder access to all work levels.
12. Don't ride on manually propelled mobile scaffolds.

Certificate of Completion

Larry Chambers

has completed the

Fall Protection Training Program

on July 27, 2007

at Atlanta, GA

Instructor Dan Sheffer

Issued by

SHEFFER ENGINEERING CO., INC.

Sheffer Engineering Company, Inc. assumes NO liability as to the unsafe actions allowed and/or conducted by the bearer of this card. It is the responsibility of the card bearer to show their knowledge in the field.

Certificate of Completion

Rudy A. Castillo

has completed the

Fall Protection Training Program

on July 27, 2007

at Atlanta, GA

Instructor Dan Sheffer

Issued by

SHEFFER ENGINEERING CO., INC.

Sheffer Engineering Company, Inc. assumes NO liability as to the unsafe actions allowed and/or conducted by the bearer of this card. It is the responsibility of the card bearer to show their knowledge in the field.

Certificate of Completion

Gabriel Smith

has completed the

Fall Protection Training Program

on July 27, 2007

at Atlanta, GA

Instructor Dan Sheffer

Issued by

SHEFFER ENGINEERING CO., INC.

Sheffer Engineering Company, Inc. assumes NO liability as to the unsafe actions allowed and/or conducted by the bearer of this card. It is the responsibility of the card bearer to show their knowledge in the field.

Certificate of Completion

Wayne Harper

has completed the

Fall Protection Training Program

on July 27, 2007

at Atlanta, GA

Instructor Dan Sheffer

Issued by

SHEFFER ENGINEERING CO., INC.

Sheffer Engineering Company, Inc. assumes NO liability as to the unsafe actions allowed and/or conducted by the bearer of this card. It is the responsibility of the card bearer to show their knowledge in the field.

Attachment 8

Emergency Response Action Plan

Table 1: Emergency Contact List

Emergency Contact	Phone Number
Local Police - Dublin Police Department	540.674.5167
Local Ambulance	911 (if appropriate)
Radford Army Ammunition Plant Fire Department	540.639.7323
Local Fire Department	911 (from cell phone); 9911 (from plant phone)
New River Unit Security Post	540.674.4988
Local Hospital (Carilion New River Valley Medical Center)	540.731.2000
Poison Control	800.332.3073
National Response Center (all spills in reportable quantities)	800.424.8802
U.S Coast Guard (spills to water)	800.424.8802
ARCADIS Project Manager - Diane Wisbeck	410.923.7834 (office); 443.909.9059 (cell)
ARCADIS Site Manager - Chris Kalinowski	919.854.1282 (office); 919.656.7731 (cell)
ARCADIS H&S Manager - Chuck Webster	315.671.9297
Client Contact - James McKenna	540.731.5782
Client Contact - Jerry Redder	540.639.7536 (office); 540.239.2990 (cell)
Client Contact - Matt Alberts	540.639.8722 (office); 540.230.3294 (cell)
Emergency Coordinator - Diane Wisbeck	410.987.0032 (office); 410.963.0050 (cell)

Emergency Notification Procedure for Project:

Step 1: Field Personnel must contact Chuck Webster or Diane Wisbeck.

Step 2: Diane Wisbeck will contact Site Manager and Client Contacts

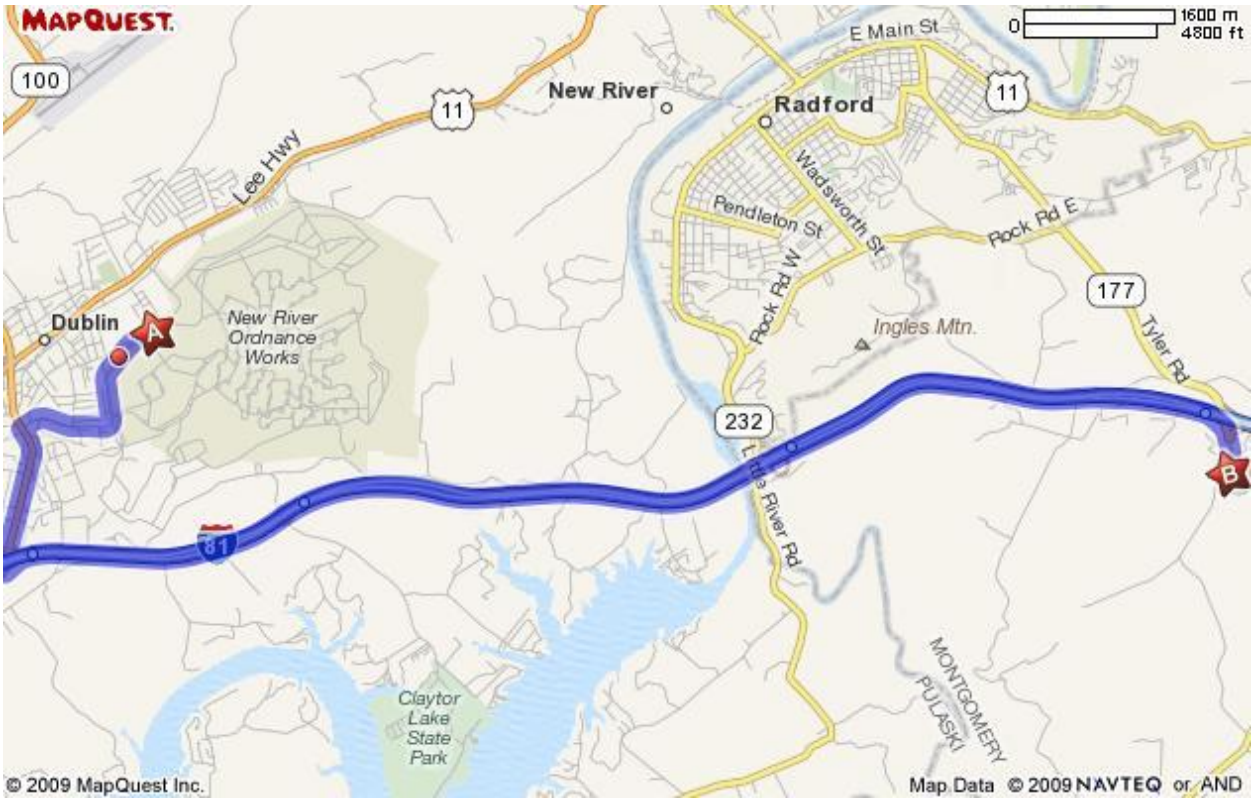
Step 3: If field personnel cannot locate Diane Wisbeck or Chuck Webster, then field personnel may contact client contacts

In the event of a medical emergency, field personnel will call 911 and then the RAAP Fire Department

Route to Hospital from Radford Army Ammunition Plant – New River Unit,

Dublin Virginia

1. From Front Gate of RAAP-NRU take **LEFT** on Bagging Plant Road. Go **1.7 miles.**
2. Turn **LEFT** on Cleburne Blvd/VA-100S. Go **1.2 miles.**
3. Turn **LEFT** to merge onto I-81N. Go **10.4 miles.**
4. Take **Exit 109** for Radford (Tyler Road). Go **0.3 miles.**
5. Take **RIGHT** on Tyler Road. Go **0.4 miles.**
6. Turn **LEFT** at Lamb Circle.
7. End at 2900 Lamb Circle, Carilion New River Valley Medical Center



American Heart Association

Learn and Live

Heartsaver® First Aid

W. Keith Carr

This card certifies that the above individual has successfully completed the objectives and skills evaluations in accordance with the curriculum of the AHA for Heartsaver First Aid Program.

Modules Completed: Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

~~12/17/2009~~
Issue Date

~~12/17/2011~~
Recommended Renewal Date

Training Center: ~~West Virginia~~

TC Address Contact Info: ~~Cintas First Aid & Safety~~

Course Location: ~~Arcadis~~

Instructor: ~~Mark Ratliff~~

Holder's Signature

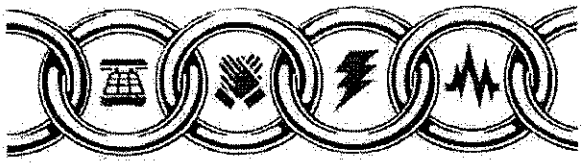
© 2006 American Heart Association *Tampering with this card will alter its appearance.* 80-1200

On the front, fill in the circles of the modules *NOT* completed: ●

Course Curriculum completed:

A. Adult First Aid
B. Environmental Emergencies
C. Adult/Child CPR With Mask
D. Adult/Child AED
E. Infant CPR With Mask

ecommended renewal for Heartsaver First Aid is every two years.



Call 911 in case of an emergency

Poison Control Center **1-800-222-1222**

Visit our website: **americanheart.org/cpr**

For traini[illegible]

American Heart Association

Learn and Live

Heartsaver® First Aid

Sandra & Kamas

This card certifies that the above individual has successfully completed the objectives and skills evaluations in accordance with the curriculum of the AHA for Heartsaver First Aid Program.

Modules Completed: Ⓐ ● Ⓒ Ⓓ ●

DEC 21 2010
Issue Date

DEC 21 2012
Recommended Renewal Date

Training Center: OHIO

TC Address Contact Info: CINTAS FAS

Course Location: BALTIMORE, MD. Loc: 014

Instructor: Lupe Lopez

Holder's Signature: Sandra Kamas

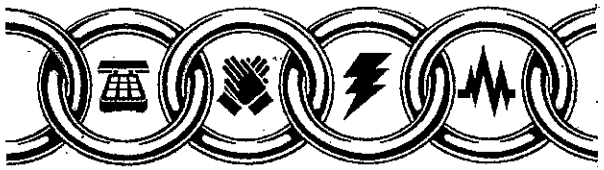
© 2006 American Heart Association *Tampering with this card will alter its appearance.* 80-1202

On the front, fill in the circles of the modules *NOT* completed: ●

Course Curriculum completed:

A. Adult First Aid
B. Environmental Emergencies
C. Adult/Child CPR With Mask
D. Adult/Child AED
E. Infant CPR With Mask

Recommended renewal for Heartsaver First Aid is every two years.



Call 911 in case of an emergency

Poison Control Center **1-800-222-1222**

Visit our website: **americanheart.org/cpr**

For training information call: **1-877-AHA-4CPR**

Gabriel Smith

has successfully completed the current nationally recognized standards for CPR. This course is recognized by the Georgia Department of Human Resources.

3-27-10 Date Issued

3-27-12 Renewal Date

Trained by:
Deborah L. Ruby & Associates Ltd.
770-267-2654

APPLIED FIRST AID

Gabriel Smith

has successfully completed a 4 hour course in Basic First Aid recognized by the Georgia Department of Human Resources.

3-27-10 Date Issued

3-27-12 Expiration Date

presented by:
Deborah L. Ruby and Associates Ltd.
770-267-2654

Roger Flores

has successfully completed the current nationally recognized standards for CPR. This course is recognized by the Georgia Department of Human Resources.

12-12-09 — Date Issued

12-12-11 — Renewal Date

Trained by:
Deborah L. Ruby & Associates Ltd.
770-267-2654

APPLIED FIRST AID

Roger Flores

has successfully completed a 4 hour course in Basic First Aid recognized by the Georgia Department of Human Resources.

12-12-09 — Date Issued

12-12-11 — Expiration Date

presented by:
Deborah L. Ruby and Associates Ltd.
770-267-2654

APPLIED FIRST AID

Larry Chambers

has successfully completed a 4 hour course in Basic First Aid recognized by the Georgia Department of Human Resources.

3-27-10 — Date Issued

3-27-12 — Expiration Date

presented by:

Deborah L. Ruby and Associates Ltd.

770-267-2654

Larry Chambers

has successfully completed the current nationally recognized standards for CPR. This course is recognized by the Georgia Department of Human Resources.

3-27-10 — Date Issued

3-27-12 — Renewal Date

Trained by:

Deborah L. Ruby & Associates Ltd.

770-267-2654

Attachment 9

ARCADIS Utility Clearance Procedure

□□ □OLIC□

It is the practice of ARCADIS and its affiliated companies to implement appropriate, reasonable and practical procedures within acceptable and customary industry practices to promote the health and safety of its employees, and avoid and mitigate exposure of risk in the performance of their work. In furtherance of this policy, ARCADIS promotes and encourages compliance by all employees with this policy and procedures relating to subsurface work and/or investigations (SWI) and working in the vicinity of above ground utilities.

- This procedure is followed by all responsible ARCADIS personnel. Such procedures are included in the project planning processes utilized by ARCADIS personnel.

- Project management procedural requirements are outlined in Section 5.2. All employees included in SWI and above ground utility work are familiar with these procedures.

- Contract Terms: In agreements for SWI with a client, prime contractor, or subcontractors, required terms (Exhibit 1) shall be included for the appropriate allocation of risk of damage to subsurface facilities. If such provisions cannot be agreed upon, the reasons are documented and other risk-management actions identified, such as limits of liability, additional physical investigations, additional lines of evidence of utility location, assignment of risk to subcontractors, etc.

- The policy of ARCADIS encourages and empowers all employees to take such action as they deem appropriate to assure compliance with this policy and procedures both in project planning and field site operations. Such authority is delegated to those on the project site to immediately stop any SWI work or work in the vicinity of above ground utilities where the employee believes that injury to persons or damage to property could occur. Such action is taken without regard to costs or schedule. Personnel should immediately notify their supervisor of any concerns they have when observing any SWI work or work in the vicinity of above ground utilities. In all agreements between ARCADIS and SWI subcontractors, (e.g., drilling subcontractors), provisions shall be included in the subcontract, work authorization or purchase order. These provisions (Exhibit 1) are found on the ARCADIS intranet at the Legal Department team site.

All ARCADIS personnel involved in SWI work or work in the vicinity of above ground utilities will be appropriately trained on this procedure and have the appropriate professional experience for oversight of or involvement in SWI work or work in the vicinity of above ground utilities. ARCADIS Corporate Health & Safety can answer further questions about this policy or the hazards associated with and the control procedure for work in the vicinity of subsurface or above ground utilities.

Again, to support the efforts of ensuring the health and safety of its employees and mitigating risk to ARCADIS, ARCADIS requires that these policies and procedures be followed and implemented at all levels of project management and field implementation.

2.0 PURPOSE AND SCOPE

2.1 Purpose

This procedure directs general safety procedures associated with the identification and management of above ground and subsurface utility locations on project sites.

2.2 Scope

2.2.1 Project Managers and Supervisors - ARCADIS personnel managing or working on any project requiring SWI and requiring work in the vicinity of above ground utilities must incorporate this procedure into their project planning and field work activities to ensure that all reasonable means to identify utilities are implemented and that appropriate controls have been put in place to minimize or eliminate damage to these utilities and the hazards associated with these utilities. All applicable procedures described in this document must be completed prior to initiating intrusive field work or field work in the vicinity of above ground utilities, or the work cannot proceed.

2.2.2 Subcontractors - Where SWI are required to be performed by a subcontractor to ARCADIS under its subcontract, project management shall require the subcontractor to adequately incorporate SWI procedures described herein into the subcontractor's scope of work.

3.0 DEFINITIONS

Above Ground Utilities For the purpose of this procedure, above ground utilities include, but are not limited to: any above ground line, system, or facility used for producing, storing, conveying, transmitting or distributing communication or telecommunications, electricity, gas, petroleum and petroleum products, coal slurry, hazardous liquids or gases, water under pressure, steam, or other hazardous materials.

Subsurface Utilities For the purposes of this procedure, subsurface utilities include, but are not limited to: any underground line, system, or facility used for producing, storing, conveying, transmitting or distributing communication or telecommunications, electricity, gas, petroleum and petroleum products, coal slurry, hazardous liquids or gases, water under pressure, steam, or sanitary sewage; underground storage tanks; tunnels and cisterns; and septic tanks.

4.0 RESPONSIBILITIES

4.1 Project Managers and Supervisors

To prevent injury to employees, avoid disruption to utility services, and help eliminate damage to subsurface and above ground utilities, project managers have the responsibility for utility identification, location, and marking prior to initiating field activities. Most states, provinces, municipalities, and clients have rules, general statutes, or laws that specify the requirements of subsurface utility location prior to intrusive subsurface field activities (i.e., excavation, trenching,

boring, and all forms of drilling operations, etc.). The project manager ensures that these laws are followed, and that the directives outlined in this procedure are met for every project involving SWI and work in the vicinity of above ground utilities.

In addition, if field activities are completed in the vicinity of above ground utilities, the project manager is responsible for working with the client to identify the nature of the utilities, and to determine what control processes need to be implemented to prevent damage to these utilities and to minimize any injury in the event there is damage.

[illegible]

Field personnel conducting SWI activities and activities where above ground utilities are in the vicinity of the work have the responsibility to read, understand, and follow this procedure and complete the appropriate checklists during the on-site utility locate process. ARCADIS personnel assisting in the identification of underground utilities need to have previous related experience of a minimum of 1 year. Those implementing remote sensing technologies must complete training in those techniques and have 6 months experience operating and interpreting results.

If utilities cannot be located to eliminate any reasonable concern, field personnel can use their Stop Work authority until utility locations can be identified. Field personnel must review this procedure onsite with ARCADIS subcontractors, and ensure they follow the procedures detailed in this document. Any ARCADIS subcontractor not following these procedures will be asked to stop work, and the project manager contacted. Any diversion from this procedure by ARCADIS field personnel must be approved by the project manager with input from Corporate Health & Safety as necessary.

[illegible] **OCED[illegible]E**

A flow chart/decision tree of the procedure is presented in Exhibit 2 of this document.

[illegible] **L**[illegible] [illegible]**E**[illegible]

The following three actions (lines of evidence) are required for the utility location process:

- Contact the State One Call
- Obtain a detailed site utility plan drawn to scale, preferably an “as-built” plan
- Conduct a detailed visual site inspection

In the event that one or more of the above lines of evidence cannot be conducted, or if the accuracy of utility location is questionable, a minimum of one additional line of evidence must be utilized as appropriate or suitable to the conditions. Examples of additional lines of evidence include but are not limited to:

- Private utility locating service
- Research of state, county or municipal utility records and maps including computer-drawn maps or geographical information systems (GIS)
- Contact with the utility provider to obtain their utility location records

- Hand augering or digging
- Hydro-knife
- Air-knife
- Radio Frequency Detector (RFD)
- Ground Penetrating Radar (GPR)
- Any other method that may give ample evidence of the presence or location of subgrade utilities

[illegible]

Field activities are planned and designed to avoid contact with and damage to, and minimize interference with subsurface and above ground utilities in the vicinity of ARCADIS work activities. During the planning phase of a project the project manager will insure the appropriate allocation of utility location responsibilities and verify their completion. The utility location activities will implement the lines of evidence as defined in Section 5.1.

5.2.1 Communication and Coordination

The PM or their designated Task Manager:

- Communicates verbally and in writing the responsibilities for utility location with each party
- Provides the list to the site safety officer for inclusion in the site-specific health and safety plan (HASP);
- Communicates potential hazards to field staff prior to mobilization;
- Instructs field staff to be aware of and implement the procedures in the Section 5.1 of this procedure and utilize the appropriate utility location checklists.
- When practical, schedules a joint meeting between the public/private utility locators and field staff to oversee the subsurface utility locating and marking in the field.
- Communicates with and provides utility location documentation to the subcontractors to verify with them the utility locations and discusses methods to be used to protect those utilities.
- Understands the subcontractor's methods for utility location and documenting the process with a clear delineation of responsibilities for utility location.

In general, subsurface utility locations marked by public utility locators are only good for 2 weeks (research your state-specific requirements). If SWI activities are not conducted during this time period, the site is remarked.

NOTE: At no time is SWI conducted based on old markings, hand-drawn maps/sketches, photographs, or by recollection/memory of field staff. If markings are smeared, removed, damaged, or impacted in any way, the site must be remarked before SWI begins. Flag markings are used in addition to paint markings wherever possible.

5.2.2 Utility Request Notifications for Public Property

Prior to intrusive work on public property (i.e., right-of-ways, easements, etc.), notification of a public one-call service center is completed a minimum of 48-72 hours (states/localities requirements vary, so the PM is responsible for verifying this) prior to initiating field activities (excluding Saturdays, Sundays, and legal holidays). Specific state or local laws related to utility location are evaluated with respect to notification and liability in the event of utility damage. During the call, the responsible party:

- Provides accurate description of the location of all areas of the SWI;
- Documents the utility locate request to record the time and date of the call, the area to be marked, the list of utility companies and municipalities that the one call service center will notify;
- Records the associated ticket (or dig) number provided by the one call service center;
- Cross references the notification list provided by the one-call service center with the list of known or suspected utilities for the property; and
- Provides accurate contact (responsible party name and phone numbers) information for the one call service center so they can subsequently communicate potential questions and/or delays related to the utility location and marking.

After receiving a request, the one-call service center sends requests to participating utility operators who have utilities in the area of the intrusive field activities. Each underground utility operator dispatches their own locators to mark their facilities with paint or flags. The project manager attempts to have field staff present during the marking of the utilities by the locator organization to ensure that the area of the SWI is included in the locating activities. It is important to note:

- Not all utility operators and municipalities participate in one call programs. In some instances, one-call programs provide a list of utility providers that participate, and a list of those that do not. The utility providers that do not participate are contacted individually so that they can

mark their own lines, and this call is documented (date of call, person receiving call, date lines will be marked, etc.);

- Public utility locators are usually only required to mark utilities within the public spaces (i.e., right of ways) or at most up to a meter on private property; and

- Knowledge of existing or suspected, but unmarked utilities are documented and communicated to the site safety officer, field staff, and the client prior to implementing field activities.

If a known or suspected subsurface utility does not participate in the state one-call program, and that provider has not been individually contacted prior to the start of SWI, then the field activities are postponed. If these utility providers are contacted and do not provide utility location services, then SWI are not performed until a private utility locating company is contracted and the locating tasks completed.

5.2.3 Nation-wi de Utility Locate Call Number 811

State and local utility notification centers participate in a “Call before you Dig” number for public safety and to protect underground infrastructure. This national number is: □□□. The number is designed to help prevent professional excavators, drillers and homeowners from damaging underground utility lines, or causing an injury or service outage while digging/drilling. For more information about the 811 services, visit www.call811.com

The number 811 is an FCC designated national n-11 number. This quick and efficient one call service will notify the appropriate utilities, who participate in the one call program. □□□ □□□□□ callers must still verify who the one call service contacts, and then determine which utilities may need to be contacted directly (e.g. those utilities not participating in the one call service) by following the requirements outlined in this procedure.

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At no time do field activities that involve SWI or work in the vicinity of above ground utilities commence without the field staff having knowledge of the location of subsurface and above ground utilities. In addition, as stated above and in general, subsurface utility locations marked by public utility locators are only good for 2 weeks (research your state-specific requirements). If SWI activities are not conducted during this time period, all lines of evidence must be re-verified.

NOTE: At no time is SWI conducted based on old markings, hand-drawn maps/sketches, photographs, or by recollection/memory of field staff. If markings are smeared, removed, damaged, or impacted in any way, the site must be remarked before SWI begins. Flag markings are used in addition to paint markings wherever possible.

5.3.1 SWI and Subsurface Utilities

Prior to the start of intrusive activities, all utilities are located and measures instituted to avoid subsurface utility hazards. No SWI will be conducted within 30 inches of a line marking. If SWI must take place within 30 inches of the line marking, an additional line of evidence must be used that will ensure the avoidance of the line. An additional safety measure can include the use of lockout/tagout to render the utility controlled.

Prior to mobilizing to the site for SWI work, field staff reviews the task details with the project manager or their designated authorized TM. This may include but is not limited to review of boring logs, excavation permits, etc. Any special site or client requirements are also discussed. Prior to initiation of any intrusive activities, the utilities and structures checklist (Exhibit 3) is reviewed and completed. Generally, the following colors apply for different types of utilities/operations:

Red – Electric;
Yellow – Natural gas/oil;
Orange – Communication/cable television;
Blue – Water;
Green – Sewer;
Pink – Temporary survey marking;
White – Proposed excavation; and
Purple – Reclaimed water

In addition, the SWI subcontractor marks (i.e., paint, stakes, etc.) the location of their operations to ensure they fall within the area that has been investigated for utilities.

Once the checklist is completed and all utilities identified, any client/site specific utility location or other utility (subsurface or above ground utilities) protection procedures (i.e. such as hand digging to a specified depth, covering or shielding lines, etc.) is completed at each location where work will be completed. If a known or suspected public subsurface utility has not been marked or the markings are not clear, the state one-call number is contacted to determine if an “emergency” locate can be requested. If so, follow the procedures outlined by the locate service and contact the project manager. If it is a private utility that is not marked, the facility manager and/or the project manager should be contacted.

If unexpected conditions are encountered (refusal, debris, pea gravel, etc.) while completing the intrusive activity, all work is immediately halted. Note that subsurface utilities at many industrial facilities are often placed in conduits or concrete to prevent damage. If a utility or subsurface structure is compromised, the field staff initiates the Emergency Action Plan Guidelines (Exhibit 5); however, more detailed emergency action procedures should be reviewed with the client and documented in the site specific health and safety plan prior to initiating work.

5.3.2 Work in the Vicinity of Above Ground Utilities

If activities take place in the vicinity of an above ground utility, the utility line can be rendered controlled (i.e. through lockout/tagout procedures) or protected from damage (i.e. covering overhead power lines). The following table is used to develop acceptable work distances for work involving machinery with high extensions (backhoes, drilling rig masts, etc.) in the vicinity of overhead power lines:

[illegible]	[illegible]
50 or below	10
Above 50 to 200	15
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45

ANSI Standard B30.5-1994, 5-3.4.5

The distance may be lengthened if directed by the client or the electric company, and any specified distances are strictly followed. In addition, work involving machinery, vehicles or equipment that may come in contact with above ground utilities is not completed until those utilities are protected or control processes are in place to avoid damage to those utilities.

If an above ground utility is discovered that has not been previously identified prior to mobilizing to the field, the field staff notifies the project manager who requests the client to assist in the identification of the utility and the implementation of control procedures as appropriate. In addition, if a utility or subsurface structure is compromised, the field staff initiates the Emergency Action Plan Guidelines (Exhibit 5); however, more detailed emergency action procedures should be reviewed with the client and documented in the site specific health and safety plan prior to initiating work.

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[illegible]

All records (maps and documentation of communications) used to determine the location of utilities should be retained and kept in the project file.

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Approved By: Mija Coppola, Director H&S, Infrastructure and PM/CM Divisions

Document Change Control

Revision Date	Revision Number	Description of Change
13 December 2006	01	Original document
26 March 2007	02	Put in new company format
15 May 2007	03	Added nation-wide 811 number
6 September 2007	04	Changing over to new template format
22 February 2008	05	Changing over to new template format
13 January 2009	06	Define lines of evidence

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S□□□ C□□□□□□□□□□□ARCADIS shall not be liable for: (i) damage or injury to any subterranean structures (including, but not limited to, utilities, mains, pipes, tanks, and telephone cables) or any existing subterranean conditions; or the consequences of such damage or injury, if (with respect to this clause (i)) such structures or conditions were unknown and were not identified or shown, or were incorrectly shown, in information or on plans furnished to or obtained by ARCADIS in connection with the Services; (ii) concealed conditions encountered in the performance of the Services; (iii) concealed or unknown conditions in an existing structure at variance with the conditions indicated by the Scope of Services or Work Authorization; or (iv) unknown physical conditions below the surface of the ground that differ materially from those ordinarily encountered and are generally recognized as inherent in work of the character provided under this Agreement.

Client shall provide to ARCADIS all plans, maps, drawing and other documents identifying the location of any subterranean structures on the Site. Prior to location of any drilling or excavation below the ground surface, ARCADIS shall obtain the concurrence of the Client as to the location for such drilling or excavation.

Should: (i) concealed conditions be encountered in the performance of the Services; (ii) concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Scope of Services or Work Authorization; or (iii) unknown physical conditions below the surface of the ground differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided under this Agreement; then the amount of this Agreement and/or time for performance shall be equitably adjusted by change order upon timely notice.

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S□□□ C□□□□□□□□□□□SUBCONTRACTOR acknowledges that time is of the essence with respect to the performance and completion of its work under this Contract. SUBCONTRACTOR shall adhere to, commence and complete its work in accordance with any schedule incorporated into this Contract, or any schedule submitted by SUBCONTRACTOR or attached hereto; and with respect to any Changes, out of scope or additional work, SUBCONTRACTOR shall expeditiously perform such work according to any schedule therefore agreed to by the parties. In the event any schedule is incorporated in this Contract or attached to this Contract, SUBCONTRACTOR acknowledges and agrees that such schedule has accounted for all inherent or reasonably anticipated delays, including but not limited to those inherent in obtaining site information, access sufficient labor, supplies, tools, equipment and utilities required for the project work, and SUBCONTRACTOR waives any claim of extra compensation or damages therefore.

Subcontractor represents and warrants that it has had an opportunity to review and/or has carefully examined all necessary drawings, maps, schematics, specifications, governmental restrictions, permits and license requirements, and all applicable laws, regulations and rules relating to the Work to be done and the Site, it surroundings and local conditions, and has made all investigations based on reasonably available information that are necessary to develop a full understanding of the hazards and difficulties which can be encountered and are likely to impact the cost or schedule to perform the Work. SUBCONTRACTOR is thus familiar with conditions at the Site as are pertinent to or which may affect the Work and has been granted the right to

conduct, and has conducted, all investigations it deems appropriate to determine that it can fulfill the requirements of this Contract. Notwithstanding any other provision of this Contract, SUBCONTRACTOR assumes the risk of all conditions, as specified in this Contract, that may affect SUBCONTRACTOR'S ability to perform the Work and will, regardless of such conditions, or the expense or difficulty of performing the Work or the negligence, if any, of ARCADIS, with respect to same, fully complete the Work for the stated price without further recourse to ARCADIS. Information on the Site and local conditions at the Site furnished by ARCADIS are not guaranteed by ARCADIS to be accurate, and is furnished only for the convenience of SUBCONTRACTOR.

The discovery of concealed conditions which could not reasonably have been anticipated by the SUBCONTRACTOR from information available to SUBCONTRACTOR may constitute a changed condition, which, to the extent such condition materially affects the cost or schedule to perform the Work, would entitle the SUBCONTRACTOR to a change and an equitable adjustment of the Contract price or time. SUBCONTRACTOR warrants that it shall conduct appropriate investigations to determine, with reasonable certainty, the location of utility and service lines, underground storage systems, and other subsurface structures of any kind before commencement of any drilling, excavation, or other work that has the potential to disturb these structures. SUBCONTRACTOR further warrants that it shall conduct independent field investigations to confirm the location of subsurface structures before commencement of subsurface work and shall not relay exclusively on plot plans or other drawings provided to SUBCONTRACTOR in conducting these investigations.

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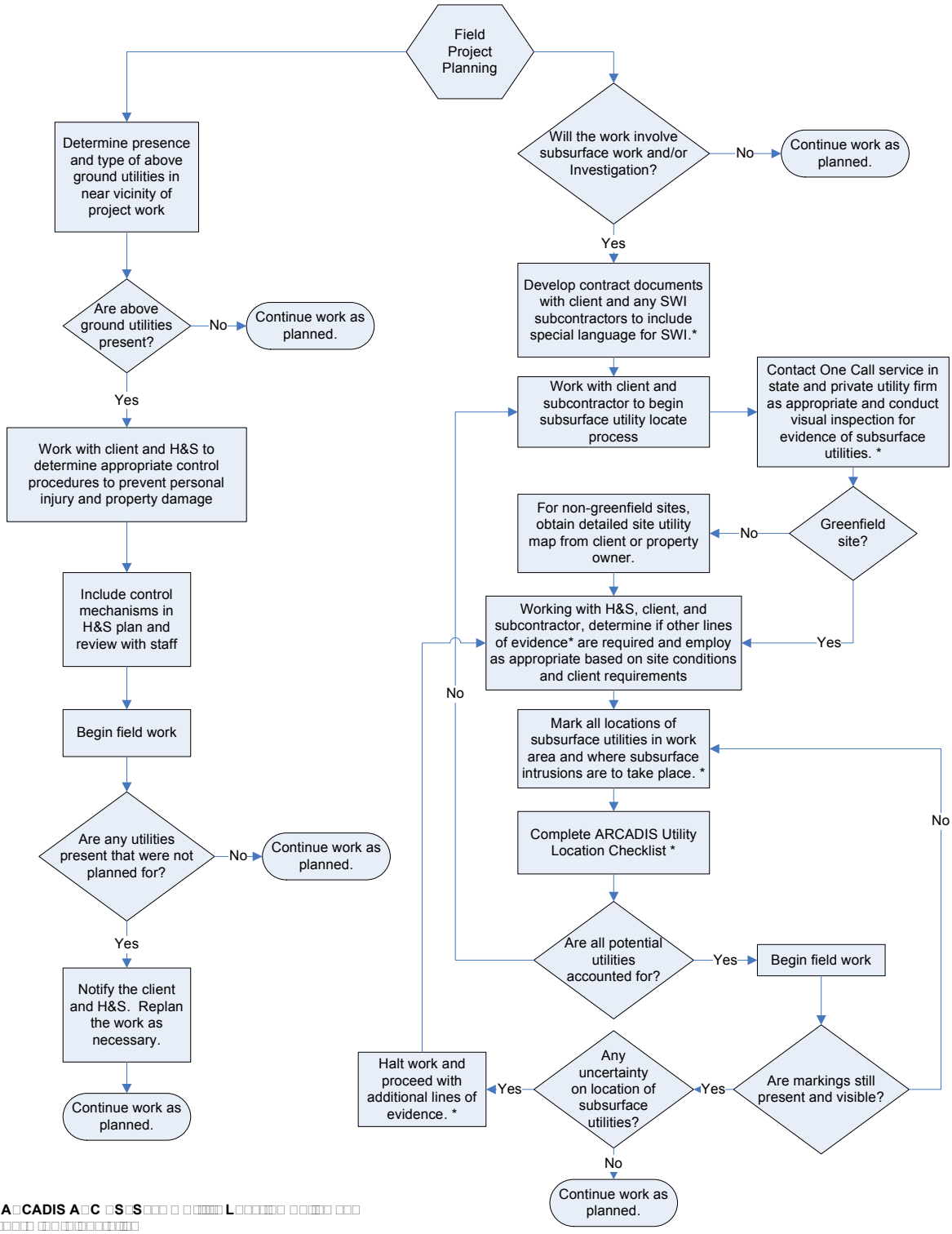
Field Project Planning
Determine presence and type of above ground utilities in near vicinity of project work
Are above ground utilities present?
No
Continue work as planned.
Yes
Work with client and H&S to determine appropriate control procedures to prevent personal injury and property damage
Include control mechanisms in H&S plan and review with staff
Begin field work
Are any utilities present that were not planned for?
No
Continue work as planned.
Yes
Notify the client and H&S. Replan the work as necessary.
Continue work as planned.
Will the work involve subsurface work and/or Investigation?
No
Continue work as planned.
Yes
Develop contract documents with client and any SWI subcontractors to include special language for SWI.*
Work with client and subcontractor to begin subsurface utility locate process
Contact One Call service in state and private utility firm as appropriate and conduct visual inspection for evidence of subsurface utilities. *
Greenfield site?
No
For non-greenfield sites, obtain detailed site utility map from client or property owner.
Yes
Working with H&S, client, and subcontractor, determine if other lines of evidence* are required and employ as appropriate based on site conditions and client requirements
No
Mark all locations of subsurface utilities in work area and where subsurface intrusions are to take place. *
Complete ARCADIS Utility Location Checklist *
Are all potential utilities accounted for?
Yes
Begin field work
Are markings still present and visible?
No
Yes
Any uncertainty on location of subsurface utilities?
Yes
Halt work and proceed with additional lines of evidence. *
No
Continue work as planned.

Exhibit **3** - Utilities and **S**tructur □s **C**heck □ist

Project:	Project **N**umbe □:
Site **L**oca □ion:	**D**ate:

Ins □ructions: This checklist will be used as a safety measure to insure that all underground utility lines, other underground structures as well as above ground utilities are clearly marked out and identified in the area selected for boring or excavation. **D□ILLIN□, E□CA□ATION□O□ AN□ T□□E O□ □□O□ND INT□□SI□E** W ORK M AY **NOT □□OCEED □NTIL LINES A□E □A□□ED AND T□IS C□EC□LIST □AS □EEN CO□ □LETED**.

Pre- □iel □ Work Requirements		
Was the state one-call notified with the required advanced notice (usually 48 to 72 hours) (or 811 Nation-wide number)	YES NO	
State one-call confirmation number		
List utility companies who do not participate in the state one call program. Were they contacted directly?		
What additional lines of evidence are used for utility clearance?		
Was a plot plan showing site features and subsurface utilities provided by the PM/TM?	YES NO	
Subgrade Utility **L**ine **L**ocation		
Where is the gas line located?		
Where is the gas meter located on the site building(s)?		
Are the electric lines subsurface or overhead? Where are they located?		
Where is electric meter located on the site building(s)?		

Where are the telephone/cable lines located? Are there any overhead lines?	
Where do these lines enter the site building(s)?	
Where are the water lines located?	
Does the site occupant use water (bathrooms, industrial uses, fire suppression, etc.)? If so where do the water lines enter the building for these purposes?	
Are there small manholes/vault covers indicating water lines? If so, where?	
Was the local municipality contacted to mark sanitary lines?	
Where are the sanitary lines located?	
Where might the sanitary lines enter the building? (i.e. what side of the building are the bathrooms, kitchens, water treatment plant, etc?)	
Where are the storm sewer lines located?	
Are there storm sewer inlets located on the property? Check inlets for direction of subsurface lines.	
Are there any gutters directing storm water to the subsurface? Evaluate for direction of lines.	
S T S	
Where are the USTs located? How many USTs are at the site (very number of USTs by counting fill ports and vent lines)?	
Where do the vent lines run?	
Where does the piping run? (Evaluate the path between USTs to dispenser islands).	
Where are the sub-surface electrical lines located which feed power to the UST system?	
L S	
Are there any cracks resembling straight lines that may indicate the settling of utility lines?	

Are there any patched areas where subsurface repairs may have been conducted?	
Are there any manhole covers or valve boxes that are not associated with marked lines?	
A **L** **L**	
Are there overhead power lines? If, so where are they located?	
What is the voltage of the overhead power lines?	
Are there any above ground structures (utilities, piping, etc.) that are used by the client? If so, are they located proximal to the work area?	
Do these lines need controlled (locked out) or protected prior to starting work?	
I **S** **O** **O** **ST**	
Name of Owner/Occupant.	
How is this person affiliated with the Site?	
Who interviewed Owner/Occupant?	
Date of Interview	
Specific comments that should be noted from the interview:	

NOTE **I** **C** **T**

Name and signature of person who conducted utility line checklist

N **S** **D**

Exhib [t 4 - Use and **L**i] itations of Utility **L**ocating Methods

Ground Penetrating Radar (GPR)

The GPR system transmits high frequency electromagnetic waves into the ground and detects the energy reflected back to the surface. Energy is reflected along boundaries that possess different electrical properties. Reflections typically occur at lithologic contacts or where subsurface materials have high electrical contrasts, including metal objects such as underground storage tanks (USTs), drums, and utility pipes. These reflections are detected by the antenna and are processed into an electrical signal that can be used to image the subsurface feature. The GPR data will be reviewed in the field to assist in the delineation of potential piping or other subsurface structures.

The detection of subsurface structures located at the site depends on the electrical properties of the soil and the structure's depth, diameter, and composition. GPR is limited to the detection of smaller diameter pipes with depth. Generally, a pipe must increase in diameter by one 1 inch for each foot in depth to be seen using GPR. Also, plastic piping is more difficult to detect than metal piping using GPR, and caution should be used if plastic utility lines are suspected.

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This instrument operates on the principle of radio frequency transmission and detection. The transmitter applies a known frequency to the pipe and the receiver is able to detect this frequency along the length of the structure. The success of RFD in tracing underground utilities is based on the composition of the structure (metal or plastic) and the ability to accurately position the transmitter unit so that it can be attached to, or placed directly over the structure. RFD should only be used to verify the location of utility mark-outs, and not as the primary method of utility identification.

Soil Vacuum **E**xcavation

This method uses nondestructive vacuum excavation methods to create a visual test hole allowing the confirmation of buried utilities. This method is very accurate and relatively fast and can be performed prior to or during the drilling program. The limiting factors for this method are cost and availability. As with specialty drilling methods, a limited number of firms have the equipment to perform vacuum excavation.

The location of the structures to be cleared relative to the source and depth of impacted soil or groundwater is considered. If the zone to be cleared is known not to contain hazardous vapors or petroleum hydrocarbons via previous testing, continuous air monitoring is implemented using a lower explosive level (LEL)/O2 meter and photoionization detector (PID) or flame ionization detector (FID) to the depth of the boring. Also consistent with the site health and safety plan (HASP), air monitoring should be conducted continuously with the LEL/O2 meter during any activity if flammable or explosive vapors are suspected to be present. Prior to any subsurface investigation activities, air monitoring should be conducted to establish background levels for total organic vapors using a PID or FID. All work activity must STOP where tests indicate the concentration of flammable vapors exceeds 10% of the LEL, and the source of vapors must be investigated.

Vacuum-assisted soil excavation utility clearance will not be used in areas know to contain hazardous vapors or petroleum hydrocarbons unless the equipment to be used is suitable for flammable/explosive atmospheres. There is a significantly increased risk of explosion if these

materials are encountered while performing this type of utility clearance. Cautions will be performed, as identified below.

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Many vacuum systems that are commonly used for utility clearance are considered unsuitable for use for environmental investigation sites. Most vacuum units are “Not for use with Hydrocarbons, Explosives, Corrosive or Toxic Material,” and are “Not Intrinsically Safe.”

Given that many units and associated tanking are not explosion-proof, the following steps will be considered prior to using vacuum- assisted utility clearance units where soils could be impacted with petroleum hydrocarbons or flammable vapors.

1. Request from the manufacturer and/or the contractor doing the work to supply manufacturers’ documentation and specifications for use of the unit at environmental sites.

2. Request documentation that the unit is intrinsically safe and may be used in areas where petroleum hydrocarbon may be present.

3. Obtain the procedures for grounding portable units to discharge potential static electricity during operation.

4 If none of the above are available, then hand auger instead and do not use vacuum-assisted methods.

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When work activities result in the contact or compromise of a utility line, an appropriate response is critical to prevent injury, death or significant property damage. Although circumstances and response vary depending on site specific conditions, the following guidelines provide information that is factored into emergency action planning associated with utility damage. In any event, emergency planning is coordinated with the entity that owns the utility and the client prior to the start of work. This planning and the appropriate response actions are documented in the project health and safety plan and reviewed with all field staff.

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Contact with above ground or underground electric lines may result in the equipment being energized. Field personnel do not assume rubber tires on equipment are insulating the equipment from the ground. For underground electric strikes, contact with the line may not be immediately noticeable but indications of a strike include: power outage, smoke, explosion, popping noises, or arching electricity. If contact with an electric line is made or is suspected, the following guidelines are followed:

- Under most circumstances, the equipment operator or any worker on a seat of the equipment should stay on the equipment. These workers should not touch anything, especially metal, on the equipment.
- If it is determined that the equipment should be vacated due to a life threatening circumstance, the worker(s) should jump clear as far as possible from the equipment. When jumping keep both feet together and hop away to a safe distance after landing on the ground. Do not use hand holds or touch any part of the equipment when preparing to jump off.
- Workers on the ground should move away from the equipment.
- Keep others away from the equipment and the area.
- If anyone is injured and in contact with the line or equipment, any attempted rescue should be performed with extreme caution. Only use long, dry, clean, unpainted pieces of wood or fiberglass pole or long dry, clean rope to retrieve the victim. Perform first aid/CPR only after the victim is sufficiently clear from the electrical hazard.
- Notify the electric utility or the client as appropriate for the site. Call 911or the client's emergency response phone number, as appropriate, for any serious injury or any situation that may result in fire or other hazard that could produce injury or property damage.

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If a natural gas line of any size is compromised, immediately:

- Shut off the equipment and remove any other ignition sources.
- Evacuate the area as quickly as possible.

- DO NOT attempt to turn off any gas valves.
- Call 911 or the designated client emergency response number as appropriate.
- Call the gas utility, if site response is not controlled by the client.
- Do not return to the area until permitted by the utility or by the approved client emergency response personnel, as appropriate.

L

Compromised water lines may rapidly become a significant hazard especially if the line is under considerable pressure. Ruptured pressurized water lines may undermine and wash out unconsolidated materials beneath equipment or structures causing them to become unstable. If a pressurized water line is ruptured, the following guidelines should be followed:

- Promptly shut off all equipment.
- Lower masts or other high extension components of the equipment.
- Evacuate area and call the water utility or client emergency response number, as appropriate.
- Turn off the water if the valve location is known and on the site property.
- If potable water lines have been ruptured, attempt to divert any flow away from structures prone to being flooded. Use caution and keep a safe distance from the line break since the ground surface may be compromised.
- For raw process water or other water of unknown quality, do not attempt to divert or contain. Avoid skin contact or accidental ingestion of any water.
- When returning to the area of the break, survey the area for signs of compromised land surface (cracks in asphalt or concrete, depressions in ground, observations of undercutting, etc.) and avoid moving any equipment until these conditions are repaired or resolved.

S

Use the same general guidelines for water lines when responding to compromised sewers. If a sanitary sewer is compromised additional guidelines should be followed to avoid contracting any bacterial illnesses. These include:

- Promptly evacuate the area.
- Avoid contact with any sewage material.
- If contaminated, promptly was with soap (antimicrobial) and water and promptly change impacted clothing.

- If sewage is accidentally ingested or infiltrates any breach of the skin or enters the eyes, seek medical attention as a precautionary measure.

- Decontaminate equipment with commercially available disinfectant solutions or a 10% chlorine bleach solution.

C **L**

Contact and compromise of communication lines are generally considered more of a financial concern than a concern associated with injury. However, eye damage may occur if looking into the ends of a cut fiber optic line. Do not look into the ends of fiber optic lines or other communication lines of unknown type. Promptly contact the communication company owning the line.

L **S** **T**

Compromise of a product line or underground storage tank (UST) requires immediate action to mitigate impact to the environment. For gasoline stations and similar facilities the following guidelines should be followed during a line or UST breach:

- Immediately shut down equipment and turn off the emergency shutoff switch for the facility dispensers.

- If there are no injuries, attempt to contain any flowing product using absorbent materials and/or by physically pumping or bailing product out of the breached area.

- If product is flowing on the surface away from the break area, attempt to protect downgradient storm drains, sewer drains, and surface water features form impact of the petroleum product using any readily available materials.

- If the bottom of a UST has been breached, immediately contact a pump truck to remove product from the affected UST.

- For releases involving diesel fuel, care will be taken to avoid any situation where diesel may be injected into the body from impalement by coated nails, wood splinters, etc. If diesel is injected into the body, seek prompt medical attention, even if no apparent symptoms of a problem exist.

- Clear area and arrange for prompt repair.

For industrial sites with lines or USTs containing multiple products with varying hazards, similar guidelines may be followed as above if the material encountered is known and workers have a fundamental understanding of the hazards associated with the material. Upon discovery of a line or UST breach due to work activities at these sites:

- Immediately stop work and notify the client representative or call the client designated emergency number. For abandoned sites call 911.

- If the material is not known, promptly evacuate the area and let HAZMAT teams deal with the release.

Attachment 10

Lead Health and Safety Procedure

1 POLICY

ARCADIS understands the hazards of personal exposure to lead. Based on this understanding, ARCADIS will implement the appropriate controls to minimize or eliminate the hazards of lead. These controls will focus first on engineering controls to mitigate lead hazards where appropriate and practical. Administrative controls may also be implemented as appropriate and practical. Where it is not appropriate or practical to implement engineering and administrative controls, personal protective equipment (PPE) will be implemented to control lead hazards below known occupational exposure limits.

2 PURPOSE AND SCOPE

2.1 Purpose

2.1.1 **Employee Protection** - This policy and associated procedures provides information to protect ARCADIS employees, subcontractors, and other affected personnel from exposures to lead while conducting work on ARCADIS projects.

2.1.2 **OSHA Standards** - This policy meets the requirements of the U.S. Occupational Safety and Health Administration (OSHA) regulations including Title 29 Code of Federal Regulations (CFR) Part 1910.1025 and Part 1926.62

2.2 Scope

This policy and the associated procedures apply to all projects where lead is known or thought to be present, and where ARCADIS employees, subcontractors and other affected personnel are or could be exposed to lead above the Action Level.

3 DEFINITIONS

Action Level is the airborne concentration established by OSHA that triggers certain regulatory requirements.

Authorized Personnel means any person authorized by ARCADIS and required by work duties to be present in lead regulated areas.

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield x-rays. Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

Lead is encountered on ARCADIS projects as a contaminant in soils, ground and surface water, sediments, and other environmental media. It can also be encountered through the air where dusts containing lead are present. Personnel may also encounter lead in other forms at certain client facilities at which ARCADIS works. It can be encountered at mining and smelting operations, battery manufacturing facilities, chemical production facilities where metal coatings or plastics are manufactured and other types of industrial sites. In addition, other activities that may expose ARCADIS staff to lead include:

- Demolition or salvage of structures where lead or materials containing lead are present
- Removal or encapsulation of materials containing lead
- New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead
- Installation of products containing lead
- Lead contamination/emergency cleanup
- Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and
- Maintenance operations associated with the construction activities described in this paragraph.

The **PEL** means a fixed ceiling of trading and retaining at least 99.9 percent of mono-dispersed particles of 0.3 micrometers in diameter.

The **Action Level** or **AL** is an airborne concentration regulatory limit established by OSHA above which requires control to protect employees from adverse health effects.

Short Term Exposure Limit or **STEL** is a PEL or TLV established as a limit of exposure measured over a designated period of time less than 8 hours.

Threshold Limit Value or **TLV** is a recommended airborne concentration limit established by ACGIH. The TLVs are reviewed and updated as appropriate annually.

Time Weighted Average or **TWA** is a measurement of airborne exposure to a chemical compound measured and averaged over a designated period of time for comparison to an STEL or an 8-hour PEL or TLV.

RESPONSIBILITIES

The Project Managers are responsible, as part of the project hazard assessment, for determining if lead is or is potentially present on a project site. In addition, the project manager is responsible for determining client requirements with respect to the control of lead hazards. Project Managers notify health and safety staff when working on sites containing lead. Project Managers are also responsible for ensuring that project staff has the appropriate and applicable training for lead prior to those staff beginning work.

The **Corporate Health and Safety** is responsible for keeping this policy and procedure up-to-date with current regulatory requirements and best practices. In addition, Corporate Health and Safety oversees the medical surveillance program for lead, as applicable and provides a lead training package to for presentation to appropriate staff.

3 Corporate Health and **Safety Staff** including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control

procedures and techniques on specific projects based on the levels of lead detected to be encountered on project facilities.

The **HS Staff** are responsible for supporting and assisting the project and task managers, and the project HS staff in the implementation of this policy and the associated procedures.

The **Project Managers** are responsible for communicating lead training as required by this policy and procedure, and for following abatement control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP. If project personnel involvement that lead is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

PROCEDURE

Lead Properties

The health effects of lead are based on the type of exposure encountered by workers.

The primary route of exposure to lead in the workplace is through inhalation of airborne lead. However, ingestion may represent a major route of exposure in contaminated workplaces. Most exposures occur with inorganic lead. Organic (tetraethyl and tetramethyl) lead, which was added to gasoline until the 1980s, is not commonly encountered. Organic forms may be absorbed through the skin, which inorganic forms cannot.

Inorganic lead is not metabolized, but directly absorbed, distributed and excreted. The rate depends on its chemical and physical form and on the physiological characteristics of the exposed person (e.g. nutritional status and age). Once in the blood, lead is distributed primarily among three compartments – blood, soft tissues (kidney, bone marrow, liver, and brain), and mineralizing tissues (bones and teeth). Absorption via the gastro-intestinal (GI) tract following ingestion is significantly dependent upon presence of levels of calcium, iron, fats, and proteins.

1.1 Exposure Limits and Regulated Areas

The following personal exposure limits are established for lead by inhalation:

- OSHA ACTION LEVEL – 30 micrograms per cubic meter of air (ug/m^3) lead in air 8-hour time weighted average (TWA).
- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
  - TWA - 50 ug/m^3 lead in air averaged over an 8 hour period.
- ACGIH THRESHOLD LIMIT VALUES (TLVs)
  - TWA – 50 ug/m^3 lead in air averaged over an 8 hour period.

☐ Personal exposure is the concentration of lead to which a person would be exposed if that person were not wearing respiratory protection. Personal exposures should be measured over the exposure period in the breathing zone of the employee. Personal exposures should not be determined by area sampling.

☐ REGULATED AREA

An area where the lead exposure does or can be expected to exceed the PEL. Since it may be difficult to determine the exposure time for employees working in areas with concentrations that exceed PEL values, the facility/location may wish to regulate any area that exceeds the 8-hour TWA PEL.. Only Authorized Persons are permitted to enter regulated areas.

9.1.2 Actions for Employee Exposures Greater Than or Equal to the Action Level but Less Than the PELs

☐ Training – Annual lead training is required.

☐ Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the Action Level on at least 30 calendar days during the coming year.

☐ Periodic Monitoring – shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the Action Level.

9.1.3 Actions for Employee Exposures Greater Than PELs

☐ Respiratory Protection – a minimum of full face air-purifying respirators equipped with HEPA filters shall be used in all regulated areas.

☐ Training – Annual lead training is required.

☐ Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the PEL on a least 10 calendar days during the coming year.

☐ Written Program – A written program to reduce personal exposure is required detailing the methods to be used to reduce exposures below the PEL. The written programs will be in the form of the Project HASP based on Project-specific and client requirements. The HASP will indicate the schedule for the implementation of any lead-related hazard control processes or methods. The HASP is reviewed periodically but at least annually per the ARCADIS SOP ARC HSFS010 – Health and Safety Plans. All project personnel have access to the Project HASP at all times.

☐ Periodic Monitoring – at least every 6 months until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL.

tion annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL Action Level.

4.1.4 Exposure Monitoring

- Representative personal exposure monitoring is required for each type of operation involving the handling of or potential exposure to lead.
- Initial monitoring can be omitted if there is documented data or industrial hygiene calculations to demonstrate that exposures are below the action level.
- Personal exposure monitoring shall utilize standard industrial hygiene sampling techniques and recordkeeping.
  - Employees who have been monitored for lead exposure shall be notified of the monitoring results within 15 working days of receipt of the results . If the PEL is exceeded, the notification must indicate the follow-up plans or corrective actions to be taken to reduce exposures to below the PEL.
- Personal TWA monitoring can be used for extended tasks, such as soil and sediment sampling, working on mine sites where lead is present, where clients require monitoring, etc.
- Area sampling can be used to determine regulated areas
- Periodic Monitoring is required if exposures exceed the Action Level or PELs.

4.1.5 Requirements for Regulated Areas

- Posting – Regulated areas shall be indicated such as by barricades, barricade tape, painted demarcations, or other devices.
- A sign shall be posted at the access to the regulated area with the warning:

DANGER

LEAD AREA

POISON

NO SMOKING OR EATING

Minimum lettering height: DANGER LEAD WORK AREA 4 letters 3 inch

- Respiratory Protection – Respirators shall be worn by all personnel when in a regulated area, regardless of the time period or over-all personal exposure measurement.
- Labeling:

– In addition to appropriate Hazard Communication labeling, containers or equipment containing lead or lead compounds must also be labeled as such:

CAUTION

ITEMS CONTAMINATED WITH LEAD

DO NOT EAT OR DRINK IN LOCATIONS OR SMOKE

DISPOSE OF LEAD CONTAMINATED MATERIALS AND WASTE WATER IN ACCORDANCE WITH LOCAL STATE AND FEDERAL REGULATIONS

- Eating, drinking, smoking, chewing any item, or applying cosmetics is strictly prohibited in a lead regulated area.

6.1. Exposure Reduction

- Written Program:

– The Project Manager and the Project Health and Safety Staff will develop a written program and make a determination as to the initial exposure levels to be included in the Project HASP for exposure reduction if there is a determination that employee exposures may exceed the OSHA Action Level. The HASP will be reviewed at least annually. The program must include:

o The locations and operations of potential lead exposure

o Means to achieve compliance

o Available air monitoring data or industrial hygiene estimates of airborne concentrations

o Schedule for implementing control procedures

o Exposure control processes

o Medical surveillance requirements

o Training requirements

o Emergency response

o The written program must list the corrective actions that will be taken to reduce employee exposure to at or below the OSHA Action Level:

o identify regulated areas/tasks and the operations where lead may be encountered

- the specific means to achieve compliance with OSHA, client, and other applicable requirements
- engineering controls
- revised work practices
- respiratory protection and protective clothing and
- scheduling of dive operations and implementation.

☐ Slips and Emergencies:

An emergency is any occurrence which may result in an unexpected significant release of lead or lead-containing compounds that may result in a significant inhalation. After an emergency, appropriate monitoring must be conducted to assure that ambient lead levels are back to normal and conduct appropriate medical surveillance for affected employee(s).

☐ Respiratory Protection and Personal Protective Equipment:

- Respirators shall be worn, maintained and managed in accordance with the OSHA standard, 29 CFR 1910.134 and ARCADIS SOP ARC HSGE01 – Respiratory Protection. In addition, any client requirements on project sites will be followed.
- Respiratory protection will be worn in areas as determined in the project HASP and per client requirements. Respirators will be at a minimum, full-face air purifying respirators equipped with HEPA filters.
- Protective clothing will be worn per the requirements of the client or the project HASP and will include at a minimum at or above the OSHA Action Level:

  Coveralls

  Gloves

  Hood

  Boots and boot covers

  Face shield (depending on operation)

  Goggles

☐ Ventilation Systems:

Where appropriate, ventilation systems will be utilized to control the release of airborne lead per the client and HASP requirements. These ventilation systems will be equipped with HEPA filtration and be maintained to ensure effective collection of the lead particulate. Personnel who maintain these systems and change the filters will be appropriately protected per this policy and procedure to minimize exposure.

- Personal Hygiene:

Where lead is present at any level, protective clothing and handling such media containing lead with wearing gloves to minimize exposure of lead to skin that can then be transferred to the mouth. In areas where lead is present, personnel will dutifully wash their hands and face before having the area to eat, drink, smoke, chew or apply cosmetics. Decontamination and changing facilities will be provided as necessary. In situations as indicated in the protective HASP, PPE will be worn to protect the skin from exposure. However, even when PPE is worn, hand and face washing is required.

9.1. Medical Surveillance

- Initial medical surveillance is required:
  - If employee personal exposures are reasonably expected to exceed the Action Level on at least 30 calendar days per year or
  - If employee personal exposures are reasonably expected to exceed the PEL on at least 10 calendar days per year.
- Periodic exams are required on an annual basis for employees who continue to meet the criteria listed above. Annual exams may be discontinued after the exam conducted this year after personal exposures fall below limits stated above in this section.
- The specific medical exam requirements are contained in detail in ARCADIS SOP ARC HSGE010 - Medical Surveillance. In addition, ARCADIS will work with WorkCare to ensure the proper medical surveillance, testing and notification is completed related to exposure to lead. This includes timing of sampling (e.g., at least every months to each covered employee at least every two months for each employee who has had blood sampling and analysis indicated a blood lead level at or above 40 ug/100 g of whole blood and at least monthly during the removal period), treatment if levels are elevated (e.g., temporary removal from the site), and employee notification (i.e., within days of levels are not acceptable).
- The physician must be supplied a copy of the OSHA lead regulation 29 CFR 1910.102 and a description of the employees lead exposure.
- For employees exposed to lead from an emergency, ARCADIS will immediately call WorkCare and follow all instructions for treatment and testing

10 TRAINING

Initial lead training is required for all employees assigned to a work area suspected or known to contain lead. This training can be accomplished at the project orientation prior to the initiation of site work.

Annual lead training is required at a minimum for all employees actually or potentially exposed to greater than the Action Level.

Initial and annual training shall consist of:

- The operations that involve lead exposure.
- The methods/observations that can be used to detect the presence or release of lead
- The physical and health hazards of lead.
- Methods used to protect against the hazards of lead including PPE and respiratory protection.
- The proper use of personal protective equipment in emergency situations.
- The meaning of a regulated area and how such area is demarcated.
- A review of the applicable standard and where copies can be found.
- An explanation of the medical surveillance program and an employees right to access medical and exposure records.

REFERENCES

- OSHA 29 CFR 1910.1025 Lead
- OSHA 29 CFR 1926.62 Lead
- ACGIH 2008 TLVs and BEIs Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices
- ARCADIS Medical Surveillance SOP ARC HSGE00
- ARCADIS Respiratory Protection SOP ARC HSGE01

RECORDS

- All exposure, medical, and training records shall be kept for 40 years or at least 20 years past the last date of employment.
- All exposure and medical records shall be made available to appropriate regulatory agencies upon written request.
- Employees who have been monitored for lead exposure shall be notified of the monitoring results within 15 working days of receipt of the results a written request is not required

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Attachment 11

ARCADIS Excavation and Trenching Procedure

1. POLICY

It is ARCADIS US policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. To those means, any work involving trenching and excavation that is under the control or direction of ARCADIS or an ARCADIS subcontractor will be accomplished following, at a minimum, this procedure.

It is ARCADIS policy that ARCADIS staff will not enter excavations and trenches unless it is absolutely necessary. If there are no suitable alternatives and it becomes necessary to enter excavations or trenches, this procedure, at a minimum will be strictly followed.

It is also the policy of ARCADIS to ensure an OSHA-defined Excavation Competent Person is on-site for all excavation work under ARCADIS contractual control. The competent person will be provided by the entity on site responsible for performing the excavation work unless otherwise required by the client. Thus, if an ARCADIS subcontractor is conducting the excavation work, that subcontractor will provide the competent person. If ARCADIS is self-performing the excavation services, then ARCADIS will provide a competent person whether a associated subcontractor or authorized employee.

2. PURPOSE AND SCOPE

2.1 Purpose

To effectively control or eliminate the hazards presented by working near or entry into excavations or trenches, this procedure sets forth the acceptable practices for and establishes the requirements for work practices near excavations and trenches and employee and subcontractor entry into such.

2.2 Scope

This procedure along with associated checklists and the Utility Location procedure (ARC HSFS019) apply to all employees of ARCADIS-US. Only trained and authorized personnel are permitted to work near or enter excavations and trenches, perform rescue services, or act as the excavation competent person.

3. DEFINITIONS

Exhibit 1 includes relevant definitions to this procedure including that for competent person qualifications.

4. RESPONSIBILITIES

4.1 Corporate H&S with Division and Practice Experts

On an annual basis, review and update, as necessary, this procedure. In addition, review cancelled checklists periodically to ensure conformance to this procedure. Provide the excavation competent person and qualified person training and retraining, or recommend qualified training provider. Provide technical assistance regarding excavation and trench

Protocol, atmospheric testing equipment, PPE, hazard assessment and research information on unusual hazards. Audit project-specific excavation sites for compliance with this procedure.

4.2 Principal in Charge (PIC), Project Manager (PM), and Task Manager (TM)

PIC, PM and TMs are responsible to:

- Verify that all excavation and trenching protocols are properly identified and addressed within the project work plan, project health & safety plan, and/or other project-related documents.
- Verify that their divisional or project team members have received adequate training provided by Corporate Health & Safety or qualified training source prior to conducting excavation/trenching entry activities.
- Verify that any ARCADIS employee acting as the Excavation Competent Person has been authorized and trained to do so as noted in Exhibit 1
- Verify that the proper entry equipment, including personal protective equipment (PPE), atmospheric testing equipment and safety equipment, is available for use by their divisional employees.
- Verify that copies of the completed checklists are available for Corporate Health and Safety review and retained with the project files

4.3 Health and Safety Plan Writers and Reviewers

Utilize this procedure as guidance to ensure the appropriate identification, assessment and control of excavation and trenching hazards for documentation in project HASPs

4.4 Entry/Work Supervisors (also see Training and Duties of Entry Supervisor)

- Work in direct coordination with and under the direction of the project excavation competent person
- Interface with the client representative to identify hazards associated with the excavation and trenching and/or work permit programs.
- Review existing soil sampling (if any) data or other pertinent hazard characterization information recorded by the client.
- Investigate the excavation/trenching protocol, to verify that any identified hazards and previous findings with earthwork at the site is properly communicated.
- Coordinate entry operations with the client employees when not client and ARCADIS employees will be working in or near an excavation/trench.

- Coordinate necessary rescue assistance with the client's in-house rescue team and/or the offsite rescue assistance specified by the client. The offsite rescue assistance specified by the client must have a typical rescue response time and be within a reasonable response distance.

- Verify that the client takes the necessary precautions in notifying their employees that our employees will be installing an excavation or trench.

- Review the lockout/tagout and isolation measures implemented by the client as necessary based on proximity of utilities or other energy sources in the area of the excavation/trench

- Immediately report any unusual or unforeseen excavation or trenching hazards to Corporate Health and Safety Prior to authorizing entry

- Verify that all tests and precautionary measures identified on the Daily/Periodic Inspection Checklist located in Exhibit 1 and the ARCADIS Utility Location Policy and Procedure ARC HSFS019 has been performed prior to authorizing subsurface work or entry into an excavation or trench

- Offer all entrants an opportunity to review the typical control measures and testing results and an opportunity to request a revaluation as necessary

- Issue, authorize, and have the Utility Clearance and Daily/Periodic Inspection forms readily available for review

- Verify that copies of the completed clearance forms and checklists are properly disseminated to Corporate Health and Safety and retained with the project files, as specified in Section 8.0 – Records.

4.5 Entrants

- Qualified Employee Entrants must have training and instruction in their duties and responsibilities regarding the following:

- Recognize the hazards which may be faced during entry, as well as the signs and symptoms of exposure to the hazard(s).

- Maintain visual contact and/or verbal communications with the attendant at all times.

- Use the PPE, air monitoring and testing equipment that has been provided or have access to the information.

- Maintain an awareness of all required hazard controls and consult with the Competent Person as necessary

- Only evacuation orders given by the Attendant, automatic alarm activation, or when self-directed.

4.6 Competent Person

Meet all of the requirements specified for the Qualified Employee. Entrants must adequate training and experience for their duties and responsibilities to complete the following tasks:

- Anticipation, identification and control of excavation and trenching hazards, as well as the signs and symptoms of exposure to the hazard(s), and the Authority to implement all corrective actions including Stop Work.
- Implement the ARCADIS Utility Clearance Policy and Procedure and complete the Daily/Periodic Excavation Inspection Checklist
- Verify adequate training and experience of all Entrants prior to entry

4.7 Attendants

- An attendant must be stationed outside the excavation and be available to monitor operations above and below ground. The attendant may have no other duties considers those listed in this section.
- All attendants must have training and instruction in their duties and responsibilities regarding excavation/trenching entry. The following are assigned duties.
- Maintain an accurate count of all entrants in the excavation
- Monitor activities both inside and outside the excavation/trench to verify the continued safety of entrants
- Maintain visual contact or verbal communication with all entrants
- Order evacuation of the excavation/trench if an uncontrolled hazard develops, either within or outside the space, or upon observing a behavioral effect of hazard exposure among entrants
- Keep unauthorized persons away from the excavation area
- Participate in non-entry rescue as appropriate
- Summon rescue and other emergency services
- Attendants must maintain current certification in basic first aid and cardiopulmonary resuscitation (CPR).

4.8 All ARCADIS Employees

Use the TRACE process described below regularly and frequently. In addition, employees read and understand all documented hazard identification and risk

assessments conducted using the HARC process and documented in HASPs, JSAs, and other written plans that are associated with their work. ARCADIS employees will:

- Recognize the hazards of trenches and excavations
- Understand and follow the methods for working near trenches and excavations
- Notify the PIC, PM, TM or entry/work supervisor if they have not received appropriate training
- Participate in entry operations only if trained and authorized to do so
- Never enter an excavation/trench without completion of the required Utility Location Procedure, Daily/Periodic Inspection Checklist and have an authorized attendant
- Never attempt entry rescue within a excavation unless trained in entry rescue with appropriate equipment available
- If unexpected conditions arise during entry, immediately notify other entrants, evacuate the area and inform the designated Competent Person

5. PROCEDURE

5.1 General Safety Requirements for all Excavations

☐ All surface obstructions must be moved or supported so as to protect employees and equipment.

☐ Prior to excavation, all underground installations (water, electric, telecommunication, gas, etc.) must be located and documented in accordance with ARCADIS Utility Clearance Policy and Procedure ARC HSFS019.

☐ When excavating in areas near underground installations, proper precautions must be taken to determine the exact location of the installations and to adequately protect and support them. While an excavation is open, underground installations shall be protected, supported or removed as necessary to protect employees.

☐ Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person.

☐ Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

☐ Ladders used for access and egress from the excavation must extend at least 3 feet (3 feet) above the landing surface.

- If personnel are working in a location exposed to vehicular traffic they must be provided with and required to wear reflective safety vests. Adequate signs, barriers or other equivalent traffic controls must be used to protect employees.

- Personnel are not permitted to be near unattended equipment or in excavations when heavy equipment is digging in or near the excavation.

- Mobile equipment located near open excavations must be adequately protected from falling or rolling into excavations by the use of barricades or warning devices.

- All excavations over 4 feet in depth must be tested for hazardous atmospheres when over personnel are required to enter and a potential exists for the presence of hazardous contaminants or oxygen deficiency. Excavations less than 4 feet in depth must be evaluated by the competent person and at the competent persons discretion be tested for hazardous atmospheres when over personnel are required to enter and a potential exists for the presence of hazardous contaminants or oxygen deficiency.

- Means of rescue including a lifeline and body harness must be used by personnel entering excavations with a potential for air hazards. A standby person must be stationed outside the excavation to tend the lifeline(s).

- Water must not be allowed to accumulate in open excavations where employees are working. When necessary, means such as diverting natural drainage around the excavation or actively pumping water must be used to prevent or control water accumulation.

- All structures adjacent to an open excavation must be supported, or a registered professional engineer (PE) must determine that the structure will not be affected by the excavation activities.

- Excavated materials (spoil) must be placed no closer than 2 feet from the edge of an open excavation, and otherwise retained to prevent loose material from falling into the excavation.

- Protection such as guardrails, barricades or covers must be in place to protect personnel from possibly falls into open excavations, pits, wells and shafts.

- Work tasks will be designed to limit the number of personnel required to enter any excavation. All tasks that can be completed remotely from outside the excavation (such as soil sampling) will be conducted in such a manner.

- Personnel will not be allowed to enter any excavation unless adequate protective systems and procedures are utilized to prevent accidents and injury.

- All excavations over four feet in depth shall be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel. As deemed necessary by the competent person, excavations less than 4 feet in depth shall be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel.

5.2 Excavations Requiring Protective Systems

This section defines excavations that require protective systems.

- All excavations into which employees will enter, regardless of depth, will be evaluated for cave-in hazards.

- Any excavation over 4 feet in depth into which employees will enter that is not entirely in stable rock as defined in this procedure.

- Any excavation near a structure, (e.g. foundations, piers, footers, walls, sidewalks, tanks, roadways, etc.), as required by the registered professional engineer reviewing the stability of the excavation and the structure.

- All excavations over 20 feet in depth must be designed by a registered professional engineer regardless of whether entering or not.

- All excavations with adjacent structures which are located a distance less than times the depth of the excavation away shall be reviewed by a registered professional engineer to determine if the stability of the structure will be affected by the excavation.

- Support systems for an adjacent structure must be designed by a registered professional engineer.

5.3 Selection and Use of Protective Systems

5.3.1 Shoring or Shielding

- If shoring or shielding is selected as the protective system for an excavation, soil classification in accordance with 1926 Subpart P Appendix A (see Section 9 of this procedure) is required.

- One of the following options must be utilized for all excavations which will be shored or shielded.

  - Timber shoring as specified in 1926 Subpart P Appendix C must be utilized

  - Hydraulic shoring, trench jacks, air shores, or shields as required in 1926.652 (c)(2) must be utilized following the system manufacturer's data

- A system which follows other tabulated data (approved by a registered professional engineer) must be utilized
- The excavation must be designed by a registered professional engineer

5.3.2 Sloping

- If sloping is selected as the protective system for an excavation, the excavation sides must be sloped at a maximum of 34 degrees (1.5 Horizontal:1 Vertical), unless the procedure listed above is followed.
- Soil classification in accordance with Section 10 of this procedure) is required for all excavations with sides which will be sloped greater than 34° (1.5 Horizontal:1 Vertical). If it will be sloped greater than 34°, the one of the following options must be utilized:
  - Option 1 - assume Type C and slope 1.5/1 - the most easily the most common and preferred method for use
  - Option 2 - classify soil according to the standard and use Type A/B sloping requirements
  - Option 3 use other tabulated data with PE approval
  - Option 4 PE approval of sloping/benching design

5.4 Atmospheric Testing for Entry

Any excavation over 4 feet in depth with a potential for hazardous contaminants or oxygen deficiency must be tested for hazardous atmospheres prior to and during activities involving entry. After atmospheric testing, if the area is found to be oxygen deficient or a hazardous atmosphere exists or could exist a confined space permit must be obtained if the area will be entered.

The site designated competent person will document initial and periodic air monitoring results for all activities requiring entry into the excavation. Atmospheric testing of excavations must be conducted in the following sequence and meet the following air quality criteria.

- Oxygen content must be 19.5 to 23.5%
- Combustible gas or vapor must not exceed 10% of its lower explosive limit (LEL)
- Toxic air contaminant levels must not exceed 50% of the PEL or TLV for the specific contaminant which ever is lower
- Carbon monoxide must not exceed 10 ppm for a minute average or ceiling value of 25 ppm

- Hydrogen sulfide must not exceed 0. ppm

5.5 Location of Underground/Overhead Utilities

- The competent person and the project manager shall not verify that local underground facilities location/protection agencies are notified within the required timeframe prior to the initiation of excavation activities and meet all requirements in the ARCADIS Utility Location Policy and Procedure ARC HSFS019.

- Prior to initiation of excavation or trenching operations the competent person shall verify that all utilities have been located.

5.6 Daily/Periodic Inspections

- Prior to initiation of daily excavation or trenching operations the competent person shall complete a daily inspection of the excavation.

- During excavation or trenching operations the competent person shall complete a periodic inspection after any event (e.g., thunderstorm, vibration, excessive drying) that may affect excavation stability.

- The competent person shall complete the daily/periodic inspection checklist (A copy of the checklist is attached to this Policy as Exhibit A. Subcontractors must complete an equivalent inspection form) is completed for each inspection of excavation and trenching activities.

5.7 Soil Classification for Selection of Protective Systems

.1 Soil Classification

This section describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. This section contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

This section applies when a sloping, benching or shoring system is utilized as a method of protection for employees from cave-ins.

.2 Soil Classification Definitions

5.7.2.1 Types/Classes of Soil

Type/Class A Soils are cohesive soils with an unconfined, compressive strength of 1. ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: Clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if the following apply.

- ☐ The soil is fissured
- ☐ The soil is subject to vibration from heavy traffic, pile driving, or similar effects
- ☐ The soil has been previously disturbed
- ☐ The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4 Horizontal:1 Vertical) or greater
- ☐ The material is subject to other factors that would require it to be classified as a less stable material

1926.2.1.1 Type C Class B Soils

- ☐ Cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa)
- ☐ Granular cohesionless soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam
- ☐ Previously disturbed soils except those which would otherwise be classed as Type C soil
- ☐ Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration
- ☐ Dry rock that is not stable
- ☐ Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4 Horizontal:1 Vertical), but only if the material would otherwise be classified as Type B

1926.2.1.2 Type C/Class C Soils

- ☐ Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less
- ☐ Granular soils including gravel, sand, and loamy sand
- ☐ Submerged soil or soil from which water is freely seeping

- Submerged rock that is not stable
- Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4 Horizontal:1 Vertical) or steeper

5.7.2.2 Methods for Classifying Soils

Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in this section. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis conducted by a competent person using tests described below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

The visual and manual analyses, such as those noted as being acceptable in this section, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

Observe the following:

- Samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine grained material is cohesive material. Soil composed primarily of coarse grained sand or gravel is granular material.

- Soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that crumbles easily and does not stay in clumps is granular.

- The sides of the open excavation and the surface area adjacent to the excavation. Cracks in openings such as tension cracks could indicate fissured material. If clumps of soil slough off a vertical side, the soil could be fissured. Small slides are evidence of moving ground and are indications of potentially hazardous situations.

- The area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

- To open side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

- To area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

- To area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

5.7.2.3 Classifications

A. Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8 inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8 inch thread can be held on one end without tearing, the soil is cohesive.

B. Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into smaller clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

C. Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of soil, as soon as practicable after excavation to exposure to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

D. Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand operated shearvane.

E. Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

1. If the sample develops cracks as it dries, significant fissures are indicated.

2. Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined by using the thumb penetration or other test.

5.7.2.4 If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

5.7.2.5 Layered system

A layered system shall be classified in accordance with its weakest layer. Each layer may be classified individually where a more stable layer lies under a less stable layer.

5.7.2.6 Reclassifying Soils

A layered system shall be classified in accordance with its weakest layer. Each layer may be classified individually where a more stable layer lies under a less stable layer.

In most instances the ARCADIS designated Excavation/Trenching Competent Person will assume Type C soil, unless they have conclusive data to validate Type A or B.

5.7.2.7 Excavation Construction Based on Soil Type

The Maximum allowable slopes and means the least inclination of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). Short-term exposure means a period of time less than or equal to 24 hours that an excavation is open. Soil and rock deposits must be

classified in accordance with Appendix A to Subpart P of Part 1926. The maximum allowable slope for a soil or rock deposit must be determined from the tables provided below. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope which is at least horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored materials or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with 1926.651(I). Configurations of sloping and benching systems must be in accordance with 29 CFR 1926 Subpart P, Appendix B.

EXCAVATION SLOPE TABLE 2
29 CFR 1926 SUBPART P APPENDIX B
MAXIMUM ALLOWABLE SLOPES

Soil or Rock Type	Maximum Allowable Slopes (H:V)[1] for Excavations Less Than 20 Feet Deep[2]
Stable Rock	Vertical (90 degrees)
Type A[3]	:1 (3 degrees)
Type B	1:1 (4 degrees)
Type C	1: (34 degrees)

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. Sloping or benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.
3. A short-term maximum allowable slope of 1/2H:1V (3 degrees) is allowed in excavations in Type A soil that are 12 feet (3.m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.m) in depth must be 3/4H:1V (3 degrees).

6. TRAINING

6.1 Project - Specific Training

All staff working on a site where trenching and excavation activities are being conducted by ARCADIS or its subcontractors will be provided with site orientation on excavation topics that include a discussion of the following:

- Site excavation hazards and procedures
- Requirements for conducting activities remotely when over possible
- Client requirements and procedures for excavation activities

- This Procedure

Daily Safety Meetings on Projects involving excavation activities shall include a discussion of:

- Site excavation hazards and procedures
- Requirements for conducting activities remotely when never or possible
- Client requirements and procedures for excavation activities
- This Excavation and Trenching Procedure, as appropriate

6.2 Additional Training

Besides site orientation training, additional training will be provided as follows based on the employees activities:

- All employees who work in the area of potential excavation/trenching sites will receive awareness level training as provided and/or approved by ARCADIS Corporate H&S in order to recognize and to understand the hazards.
- Entrants, Attendants, and Entrant Supervisors will receive additional training as approved by Corporate H&S. This training will be classroom in nature and cover the details of trenching and excavation hazards and controls
- Qualified Competent Persons will be provided training as follows:

  In order to be assigned duties as a competent person with respect to excavation and trenching, in addition to the criteria noted in Exhibit 1, personnel must complete an ARCADIS approved training course or an equivalent course approved by Corporate H&S and Safety including but not limited to the following topics:

  - Introduction to trenches and excavations
    - Definition of trenches and excavations
    - General requirements of OSHA 29 CFR 1926 Subpart P
  - Responsibilities and requirements of a competent person
    - Necessary authority
    - When other/outside resources may be necessary
  - Hazard Identification and Assessment
    - Cave-In Hazards including nearby structures
    - Underground utilities

- Confined Space
- Hazardous atmospheres
- Water accumulation
- Vehicular traffic and falling loads

- Hazard controls
  - Soil analysis and testing (visual and manual)
  - Protective systems
    - Shoring
    - Sloping
    - Shielding
    - Benching
  - Personal protective equipment
  - Utility location
  - Atmospheric testing
  - Water drainage and pumping
  - Site housekeeping and management
    - Spoils
    - Traffic control
    - Overhead hazard protection
  - Communications
    - Verbal
    - Signaling
  - Access and egress

- Emergency Procedures
  - Warning signs of cave-in
  - Evacuation procedures

- Rescue

- Inspections
  - Checklists
  - Potential deficiencies

All training provided must be reviewed and approved by Corporate Health & Safety and will be managed through ARCHIMEDES.

Documentation of training certification received by attendance at any training course including external training provided by the employee with copies provided to ARCHIMEDES.

7. REFERENCES

7.1 ARCADIS Health and Safety Procedure ARC HSFS010 Health and Safety Planning

7.2 ARCADIS Health and Safety Procedure ARC HSFS004 Control of Hazardous Energy (Lockout/Tagout)

7.3 ARCADIS Utility Clearance Policy and Procedure ARC HSF019

7.4 ARCADIS Confined Space Policy and Procedure ARC HSF003

7.5 OSHA 29 CFR Part 1926 Subpart P - Excavations

8. RECORDS

8.1 Training records will be kept by the individual employee with copies of such certificates kept by ARCHIMEDES. Training dates and times will be kept by ARCHIMEDES.

8.2 Completed clearance forms and checklists will be kept in the project files with copies available for Corporate H&S review.

8.3 Copies of all HASPs that document excavation trenching procedures will be kept in the project files.

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Michael A. Thomas, CIH, CPEA

History of Change

Revision Date	Revision Number	Reason for change
12 May 2008	01	Original document
13 June 2008	02	Modified Section 1.14 unit rate to structural ramps. Modified Section 2.2 to designate a safety factor for structural integrity of structures near the excavation. Revised Exhibit 1 to modify the definition of a Competent Person
9 January 2009	03	Changed used definitions, deleted training requirements from Section 10 and moved them to Section 10, modified purpose statement

Exhibit 1 – Definitions

Attendant is a trained qualified individual stationed outside the excavation whose duty is to monitor authorized entrants inside the excavation or trench and has a means of communication with the designated rescue service.

Benching/Benching system means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.

Competent person means one who, through education, training, and/or experience, is capable of identifying existing and predictable hazards or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them. At ARCADIS employees, must meet the following minimum requirements to be considered a Competent Person:

- Be nominated to the appropriate Division H&S Director by their supervisor or project manager to be considered as a competent person. The nomination will include the submittal of various documentation that describes why the person should be nominated and to provide evidence that they have met the criteria listed below.
- Be jointly approved by the appropriate Division H&S Director and the appropriate Practice/Client H&S Manager or resource.
- Attend ARCADIS Competent Person training or an equivalent course approved by Corporate Health and Safety
- Have a minimum of 1 year of supervised field experience and approval from their supervisor to fill the role of competent person
- If on an Environmental project where HAZWOPER training is required by ARCADIS, completed a 40 Hour HAZWOPER and HAZWOPER Supervisor training course and be current on their annual 8 Hour refresher
- Attended a 10 or 30 Hour OSHA Construction Safety Course or have equivalent training to that provided by the 10 or 30 hour course
- If a hazardous atmosphere is present, or the air is limited entry or exit and the excavation or trench must be entered as a confined space, the person must also be Confined Space trained and authorized as per the ARCADIS Confined Space Procedure ARC HSFS003

Excavation means any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal into which a person can bodily enter. **Entry** constitutes the act by which an employee proceeds into an excavation or trench. Consideration of hazards, especially cave-ins and fall protection must still be considered and accounted for when equipment or personnel are near an excavation or trench, even if personnel will not be entering.

Entrants are employees who are trained and authorized to enter a trench or excavation. Entrants must have attended a qualified Excavation Training course offered or approved by Corporate Health and Safety.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous Atmosphere is an atmosphere which exposes employees to a risk of death, incapacitation, injury, or acute illness from one or more of the following:

- An atmospheric concentration of any substance in excess of 10% of its established permissible exposure limit (PEL) or its assigned threshold limit value (TLV) or other value listed on the Material Safety Data Sheet (MSDS) for the chemical constituent, whichever is lower.
- A flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL).
- An airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less.
- An atmospheric oxygen concentration below 19.5% (oxygen-deficient atmosphere) or above 23.5% (oxygen-enriched atmosphere).
- An atmosphere which is immediately dangerous to life and health.

Immediately Danger to Life and Health (IDLH) means any condition which poses an immediate threat to loss of life, may result in irreversible or immediate-severe health effects may result in any damage, irritation, or other conditions which could impair escape from the space.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems and other systems that provide protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a registered professional engineer within the meaning of this standard when approving designs for manufactured protective systems or tabulated data to be used in interstate commerce. To oversee an excavation/trench activity the PE must have training and experience in excavation, soil and stability considerations.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as trench boxes or trench shields.

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Trench means a narrow excavation (in relation to its length) made below the surface of the ground in which a person can bodily enter. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 meters) or less (measured at the bottom of the excavation), the excavation is considered to be a trench.

Cemented soil means a soil in which particles are bonded together by a chemical agent, such as calcium carbonate, such that a hand sized sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sides, and is plastic when moist. Cohesive soil is hard to crush when dry, and exhibits significant cohesion when submerged. Cohesive soils include clay, silty clay, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to crack along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or soil are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

Soil classification system means, for the purposes of this procedure, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

Submerged soil means soil which is underwater or is free seeping.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

Exhibit 2 – Daily / Periodic Excavation Inspection Checklist

ARCADIS		Daily / Periodic Excavation Inspection Checklist
Project Name:		**Date / Time:**
Project Number:		**Location:**
Prepared By:		**Project Manager:**

This checklist must be completed for all excavations. It documents that daily and post-event / periodic inspections are conducted.

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ARCADIS Excavation Competent Person:			**Date/Time:**

Attachment 12

Material Safety Data Sheets

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades **MSDS No. 9950**

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. Jan-04)

Amerada Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800)424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732)750-6000
MSDS Internet Website www.hess.com/about/environ.html

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS * (rev. Jan-04)

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Gasoline (86290-81-5)	100
Benzene (71-43-2)	0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)
n-Butane (106-97-8)	< 10
Ethyl Alcohol (Ethanol) (64-17-5)	0 - 10
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Tertiary-amyl methyl ether (TAME) (994-05-8)	0 to 17.2
Toluene (108-88-3)	1 - 25
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 - 15

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

3. HAZARDS IDENTIFICATION (rev. Dec-97)

EYES
Moderate irritant. Contact with liquid or vapor may cause irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (rev. Dec-97)

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES (rev. Dec-97)

FLAMMABLE PROPERTIES:

FLASH POINT:	-45 °F (-43°C)
AUTOIGNITION TEMPERATURE:	highly variable; > 530 °F (>280 °C)
OSHA/NFPA FLAMMABILITY CLASS:	1A (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.4%
UPPER EXPLOSIVE LIMIT (%):	7.6%

FIRE AND EXPLOSION HAZARDS

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 “Low Expansion Foam - 1994 Edition.”

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (rev. Dec-97)

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product

vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Dec-97)

HANDLING PRECAUTIONS

******USE ONLY AS A MOTOR FUEL******
******DO NOT SIPHON BY MOUTH******

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Jan-04)

EXPOSURE LIMITS

Component (CAS No.)	Exposure Limits			
	Source	TWA (ppm)	STEL (ppm)	Note
Gasoline (86290-81-5)	ACGIH	300	500	A3
Benzene (71-43-2)	OSHA	1	5	Carcinogen
	ACGIH	0.5	2.5	A1, skin
	USCG	1	5	
n-Butane (106-97-8)	ACGIH	800	--	2003 NOIC: 1000 ppm (TWA) Aliphatic Hydrocarbon Gases Alkane (C1-C4)
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--	
	ACGIH	1000	--	A4
Ethyl benzene (100-41-4)	OSHA	100	--	
	ACGIH	100	125	A3

Component (CAS No.)	Exposure Limits			
	Source	TWA (ppm)	STEL (ppm)	Note
n-Hexane (110-54-3)	OSHA	500	--	
	ACGIH	50	--	skin
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)
	ACGIH	50	--	A4 (skin)
1,2,4- Trimethylbenzene (95-63-6)	ACGIH	25	--	
Xylene, mixed isomers (1330-20-7)	OSHA	100	--	
	ACGIH	100	150	A4

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem ®, products or equivalent is recommended based on degree of exposure.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Jan-04)

APPEARANCE

A translucent, straw-colored or light yellow liquid

ODOR

A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	Odor Detection	Odor Recognition
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 °F (39 to 200 °C)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H_2O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %

SOLUBILITY (H_2O): Non-oxygenated gasoline - negligible (< 0.1% @ 77 ^oF). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 ^oF); ethanol is readily soluble in water

10. STABILITY and REACTIVITY (rev. Dec-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES (rev. Dec-97)

ACUTE TOXICITY

Acute Dermal LD50 (rabbits): > 5 ml/kg
Acute Oral LD50 (rat): 18.75 ml/kg
Primary dermal irritation (rabbits): slightly irritating
Draize eye irritation (rabbits): non-irritating
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenicity: OSHA: NO IARC: YES - 2B NTP: NO ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION (rev. Jan-04)

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS (rev. Dec-97)

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION (rev. Jan-04)

DOT PROPER SHIPPING NAME:	Gasoline
DOT HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1203
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

PLACARD:

15. REGULATORY INFORMATION (rev. Jan-04)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION WT. PERCENT
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION - Parts per million (ppm) by weight
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION (rev. Jan-04)

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
	* CHRONIC		

SUPERSEDES MSDS DATED: 12/30/97

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212)642-4900
API	American Petroleum Institute (202)682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

MATERIAL SAFETY DATA SHEET

Diesel Fuel □**A**ll **T**ypes) □**SDS N**□. 9909

E□E□□ENC□ O□E□□IE□
CA□TION!
OS□A□N□□A CO□ □□STI□LE LI□□ID - SLI□ □T TO □ODE□ATE I□□ITANT
E□□ECTS CENT□AL NE□□O□S S□STE□
H**A**RMFU **L O□ □ATAL I□ S□ ALLO□ ED**

Moderate fire hazard. **A**voi] breathing vapors or mists. May cause dizzi]ess and drowsiness. May cause moder]te eye i rita ion and skin irrit]tion (rash [.
L□□□□□□□□□□ , □□□□□□□□□□ □□□□□□□□□ may □ause □□□□ □□□□□□□□
I□ingested, do **NOT** induce vom [ting, as th [s may cause chemical pneumonia (flu [d in the lungs).

NFPA □04 (S□ction 16)

1. C□E□ICAL □□OD□CT AND CO□ □AN□ IN□O□□ATION

Hess **C**orpo [ation
1 Hess Plaza
Woodbr dge, **N**□ 07095-]961

E□E□□ENC□ TELE□□ONE NUMB **E**R [24 hr]□□ **C□E□T□EC** (800) 424 □□**3**00
CO□ □AN□ CONTACT □□usi]ess h □u[s □□ Cor□orat□ Saf□ty □□32) 7□0-□000
□**SDS INTE□NET □ E□SITE**: www.□□ss.com (See Environm□nt, H□a[t□, Saf□ty & Socia□R□s□onsi□i□ity)

S□NON□□S: U[tra Low Su[fur Di□s□□(ULSD); Low Su[fur Di□s□; Motor V□□ic□□ Di□s□□Fu□□; Di□s□□ Fu□□□2; Dy□d Di□s□□Fu□□□Non-Road, Locomotiv□ and Marin□ Di□s□□Fu□□□Ta□-□□□m□t Di□s□□Fu□□

See S□ction 16 for a□□r□viations and acronyms.

2. CO□ □OSITION and C□E□ICAL IN□O□□ATION ON IN□ □EDIENTS

IN□ □EDIENT NA□ E □CAS N□□□	CONCENT□ATION □E□CENT BY □ EI□ □T
Di□s□□Fu□□(68476-34-6)	100
Na□□t□a□□n□(91-20-3)	Ty□ica□y < 0.01

A com□□□□mi□tur□ of □ydrocar□ons wit□ car□on num□□rs in t□□ rang□ C9 and □ig□□r. Di□s□□fu□□may be dy□d (r□d) for ta□ □ur□os□s. May contain a mu□tifunctiona□additiv□.

3. □A□A□DS IDENTI□ICATION

E□ES
Contact wit□ i□uid or va□or may caus□ mi□d irritation.

S□IN
May caus□ s□in irritation wit□ □ro□ong□d or r□□□at□d contact. Practica□y non-to□ic if a□sor□□d fo□owing acut□ (sing□□) □□□osur□. Li□uid may be a□sor□□d t□roug□ the s□in in to□ic amounts if □arg□ ar□as of s□in ar□ r□□□at□d□y □□□os□d.

IN□ESTION
The ma□or □□a□t□ t□r□at of ing□stion occurs from the dang□r of as□iration (□r□at□ing) of i□uid dro□s into the □ungs, □articu□ar□y from vomiting. As□iration may r□su□t in c□□mica□□n□umonia (f□uid in t□□ □ungs), s□v□r□ □ung damag□, r□s□iratory fai□ur□ and □v□n d□at□.

Ing□stion may caus□ gastroint□stina□distur□anc□s, inc□uding irritation, naus□a, vomiting and diarr□□a, and c□ntra□n□rvous syst□m (□rain) □ff□cts simi□ar to a□co□o□into□ication. In s□v□r□ cas□s, tr□mors, convu□sions, □oss of consciousn□ss, coma, r□s□iratory arr□st, and d□at□ may occur.

IN[illegible]ALATION
E[illegible]c[illegible]ssiv[illegible] [illegible]osur[illegible] may caus[illegible] irritations to t[illegible] nos[illegible], t[illegible]roat, [illegible]ungs and r[illegible]s[illegible]iratory tract. C[illegible]ntra[illegible]n[illegible]rvous syst[illegible]m ([illegible]rain) [illegible]ff[illegible]cts may inc[illegible]ud[illegible] [illegible]adac[illegible], di[illegible]in[illegible]ss, [illegible]oss of [illegible]a[illegible]anc[illegible] and coordination, unconsciousn[illegible]ss, coma, r[illegible]s[illegible]iratory fai[illegible]ur[illegible], and d[illegible]at[illegible].

[illegible] **A[illegible]NIN[illegible]**: t[illegible] [illegible]urning of any [illegible]ydrocar[illegible]on as a fu[illegible] in an ar[illegible]a wit[illegible]out ad[illegible]uat[illegible] v[illegible]nti[illegible]ation may r[illegible]sul[illegible] in [illegible]a[illegible]ardous [illegible]v[illegible]s of com[illegible]ustion [illegible]roducts, inc[illegible]uding car[illegible]on mono[illegible]id[illegible], and inad[illegible]uat[illegible] o[illegible]yg[illegible]n [illegible]v[illegible]s, w[illegible]ic[illegible] may caus[illegible] unconsciousn[illegible]ss, suffocation, and d[illegible]at[illegible].

C[illegible][illegible]ONIC E[illegible][illegible]ECTS [illegible][illegible] CA[illegible]CINO[illegible]ENICIT[illegible]
Simi[illegible]ar [illegible]roducts [illegible]roduc[illegible]d s[illegible]in canc[illegible]r and syst[illegible]mic to[illegible]icity in [illegible]a[illegible]oratory anima[illegible]s fo[illegible]owing r[illegible][illegible]at[illegible]d a[illegible][illegible]ications. T[illegible][illegible] significanc[illegible] of t[illegible][illegible]s[illegible] r[illegible]sul[illegible]ts to [illegible]uman [illegible][illegible]osur[illegible]s [illegible]as not [illegible][illegible]n d[illegible]t[illegible]rmin[illegible]d - s[illegible][illegible] S[illegible]ction 11 To[illegible]ico[illegible]ogica[illegible]Information.

IARC c[illegible]assifi[illegible]s w[illegible]o[illegible][illegible] di[illegible]s[illegible][illegible]fu[illegible][illegible][illegible][illegible]aust [illegible]articu[illegible]at[illegible]s as [illegible]ro[illegible]a[illegible]y carcinog[illegible]nic to [illegible]umans (Grou[illegible] 2A). NIOSH r[illegible]gards w[illegible]o[illegible][illegible] di[illegible]s[illegible][illegible]fu[illegible][illegible][illegible][illegible]aust [illegible]articu[illegible]at[illegible]s as a [illegible]ot[illegible]ntia[illegible]caus[illegible] of occu[illegible]ationa[illegible]ung canc[illegible]r [illegible]as[illegible]d on anima[illegible]studi[illegible]s and [illegible]imit[illegible]d [illegible]vid[illegible]nc[illegible] in [illegible]umans.

[illegible]EDICAL CONDITIONS A[illegible][illegible]A[illegible]ATED [illegible][illegible] E[illegible][illegible]OS[illegible][illegible]E
Irritation from s[illegible]in [illegible][illegible]osur[illegible] may aggravat[illegible] [illegible][illegible]isting o[illegible][illegible]n wounds, s[illegible]in disord[illegible]rs, and d[illegible]rmatitis (ras[illegible]).

[illegible][illegible] [illegible]I[illegible]ST AID [illegible]EAS[illegible][illegible]ES

E[illegible]ES
In cas[illegible] of contact wit[illegible] [illegible]y[illegible]s, imm[illegible]diat[illegible]y f[illegible]us[illegible] wit[illegible] c[illegible][illegible]an, [illegible]ow-[illegible]r[illegible]ssur[illegible] wat[illegible]r for at [illegible]ast 1[illegible] min. Ho[illegible]d [illegible]y[illegible]ids o[illegible][illegible]n to [illegible]nsur[illegible] ad[illegible][illegible]uat[illegible] f[illegible]us[illegible]ing. S[illegible][illegible]k m[illegible]dica[illegible]att[illegible]ntion.

S[illegible]IN
R[illegible]mov[illegible] contaminat[illegible]d c[illegible]ot[illegible]ing. Was[illegible] contaminat[illegible]d ar[illegible]as t[illegible]oroug[illegible]y wit[illegible] soa[illegible] and wat[illegible]r or wat[illegible]r[illegible]ss [illegible]and c[illegible][illegible]ans[illegible]r. O[illegible]tain m[illegible]dica[illegible]att[illegible]ntion if irritation or r[illegible]dn[illegible]ss d[illegible]v[illegible]o[illegible]s.

IN[illegible]ESTION
DO NOT INDUCE VOMITING. Do not giv[illegible] i[illegible]uids. O[illegible]tain imm[illegible]diat[illegible] m[illegible]dica[illegible]att[illegible]ntion. If s[illegible]ontan[illegible]ous vomiting occurs, [illegible]an victim forward to r[illegible]duc[illegible] t[illegible][illegible] ris[illegible] of as[illegible]iration. Monitor for [illegible]r[illegible]at[illegible]ing difficu[illegible]ti[illegible]s. Sma[illegible]amounts of mat[illegible]ria[illegible] w[illegible]ic[illegible] [illegible]nt[illegible]r t[illegible][illegible] mout[illegible] s[illegible]ou[illegible]d [illegible][illegible] rins[illegible]d out unti[illegible] t[illegible][illegible] tast[illegible] is dissi[illegible]at[illegible]d.

IN[illegible]ALATION
R[illegible]mov[illegible] [illegible][illegible]rson to fr[illegible]s[illegible] air. If [illegible][illegible]rson is not [illegible]r[illegible]at[illegible]ing [illegible]rovid[illegible] artificia[illegible]r[illegible]s[illegible]iration. If n[illegible]c[illegible]ssary, [illegible]rovid[illegible] additiona[illegible]o[illegible]yg[illegible]n onc[illegible] [illegible]r[illegible]at[illegible]ing is r[illegible]stor[illegible]d if train[illegible]d to do so. S[illegible][illegible]k m[illegible]dica[illegible]att[illegible]ntion imm[illegible]diat[illegible]y.

[illegible][illegible] [illegible]I[illegible]E [illegible]I[illegible][illegible]TIN[illegible] [illegible]EAS[illegible][illegible]ES

[illegible]LA[illegible][illegible]A[illegible]LE [illegible][illegible]O[illegible]E[illegible]TIES[illegible]

FLASH POINT:	[illegible]12[illegible] °F ([illegible]2 °C) minimum PMCC
AUTOIGNITION POINT:	494 °F (2[illegible][illegible] °C)
OSHA/NFPA FLAMMABILITY CLASS:	2 (COMBUSTIBLE)
LOWER E[illegible]PLOSIVE LIMIT ([illegible]):	0.[illegible]
UPPER E[illegible]PLOSIVE LIMIT ([illegible]):	[illegible].[illegible]

[illegible]I[illegible]E AND E[illegible][illegible]LOSION [illegible]A[illegible]A[illegible]DS
Va[illegible]ors may [illegible][illegible] ignit[illegible]d ra[illegible]id[illegible]y w[illegible][illegible]n [illegible][illegible]os[illegible]d to [illegible][illegible]at, s[illegible]ar[illegible], o[illegible][illegible]n f[illegible]am[illegible] or ot[illegible][illegible]r sourc[illegible] of ignition. W[illegible][illegible]n mi[illegible][illegible]d wit[illegible] air and [illegible][illegible]os[illegible]d to an ignition sourc[illegible], f[illegible]amma[illegible][illegible] va[illegible]ors can [illegible]urn in t[illegible][illegible] o[illegible][illegible]n or [illegible][illegible][illegible]od[illegible] in confin[illegible]d s[illegible]ac[illegible]s. B[illegible]ing [illegible][illegible]avi[illegible]r t[illegible]an air, va[illegible]ors may trav[illegible][illegible]ong distanc[illegible]s to an ignition sourc[illegible] and f[illegible]as[illegible] [illegible]ac[illegible]. Runoff to s[illegible]w[illegible]r may caus[illegible] fir[illegible] or [illegible][illegible][illegible]osion [illegible]a[illegible]ard.

E[illegible]TIN[illegible] [illegible]IS[illegible]IN[illegible] [illegible]EDIA
SMALL FIRES: Any [illegible][illegible]tinguis[illegible][illegible]r suita[illegible][illegible] for C[illegible]ass B fir[illegible]s, dry c[illegible][illegible]mica[illegible], CO2, wat[illegible]r s[illegible]ray, fir[illegible] fig[illegible]ting foam, or Ha[illegible]on.

LARGE FIRES: Wat[illegible]r s[illegible]ray, fog or fir[illegible] fig[illegible]ting foam. Wat[illegible]r may [illegible]e in[illegible]ff[illegible]ctiv[illegible] for fig[illegible]ting t[illegible]e fir[illegible], [illegible]ut may [illegible]e us[illegible]d to coo[illegible] fir[illegible]-[illegible]e[illegible]os[illegible]d contain[illegible]rs.

[illegible]I[illegible]E [illegible]I[illegible]TIN[illegible] INST[illegible]CTIONS

Sma[illegible] fir[illegible]s in t[illegible]e inci[illegible]i[illegible]nt ([illegible]e ginning) stag[illegible] may ty[illegible]ica[illegible]y [illegible]e [illegible]tinguis[illegible]d using [illegible]and[illegible]e[illegible]d [illegible]orta[illegible]le fir[illegible] [illegible]tinguis[illegible]rs and ot[illegible]er fir[illegible] fig[illegible]ting [illegible]ui[illegible]m[illegible]nt.

Fir[illegible] fig[illegible]ting activiti[illegible]s t[illegible]at may r[illegible]su[illegible]t in [illegible]ot[illegible]ntia[illegible][illegible]e[illegible]osur[illegible] to [illegible]ig[illegible] [illegible]e[illegible]at, smo[illegible]e or to[illegible]ic [illegible]y-[illegible]roducts of com[illegible]ustion s[illegible]ou[illegible]d r[illegible]e[illegible]uir[illegible] NIOSH/MSHA- a[illegible]e[illegible]rov[illegible]d [illegible]r[illegible]essur[illegible]-d[illegible]mand s[illegible]f-contain[illegible]d [illegible]r[illegible]at[illegible]ing a[illegible]e[illegible]aratus wit[illegible] fu[illegible]fac[illegible]i[illegible]c[illegible] and fu[illegible]i[illegible]rot[illegible]ctiv[illegible] c[illegible]ot[illegible]ing.

Iso[illegible]at[illegible] ar[illegible]a around contain[illegible]r invo[illegible]v[illegible]d in fir[illegible]. Coo[illegible]tan[illegible]s, s[illegible]e[illegible]s, and contain[illegible]rs [illegible]e[illegible]os[illegible]d to fir[illegible] and [illegible]e[illegible]c[illegible]ssiv[illegible] [illegible]e[illegible]at wit[illegible] wat[illegible]r. For massiv[illegible] fir[illegible]s t[illegible]e us[illegible] of unmann[illegible]d [illegible]e[illegible]os[illegible] [illegible]o[illegible]d[illegible]rs or monitor no[illegible][illegible]e[illegible]s may [illegible]e advantag[illegible]ous to furt[illegible]er minimi[illegible] [illegible]e[illegible]rsonn[illegible][illegible]e[illegible]osur[illegible]. Ma[illegible]or fir[illegible]s may r[illegible]e[illegible]uir[illegible] wit[illegible]drawa[illegible], a[illegible]owing t[illegible]e tan[illegible] to [illegible]urn. Larg[illegible] storag[illegible] tan[illegible] fir[illegible]s ty[illegible]ica[illegible]y r[illegible]e[illegible]uir[illegible]s s[illegible]e[illegible]cia[illegible]y train[illegible]d [illegible]e[illegible]rsonn[illegible]e[illegible] and [illegible]e[illegible]ui[illegible]m[illegible]nt to [illegible]e[illegible]tinguis[illegible] t[illegible]e fir[illegible], oft[illegible]n inc[illegible]uding t[illegible]e n[illegible]e[illegible]d for [illegible]ro[illegible]e[illegible]ly a[illegible]e[illegible]i[illegible]d fir[illegible] fig[illegible]ting foam.

S[illegible]e S[illegible]ction 1[illegible] for t[illegible]e NFPA [illegible]04 Ha[illegible]ard Rating.

[illegible]e ACCIDENTAL [illegible]ELEASE [illegible]EAS[illegible]ES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuat[illegible] non[illegible]ss[illegible]ntia[illegible][illegible]e[illegible]rsonn[illegible]e[illegible] and r[illegible]mov[illegible] or s[illegible]cur[illegible] a[illegible]ignition sourc[illegible]s. Consid[illegible]r wind dir[illegible]ction[illegible]stay u[illegible]wind and u[illegible]i[illegible], if [illegible]ossi[illegible][illegible]. Eva[illegible]uat[illegible] t[illegible]e dir[illegible]ction of [illegible]roduct trav[illegible], di[illegible]ing, s[illegible]w[illegible]rs, [illegible]tc. to confirm s[illegible]i[illegible] ar[illegible]as. S[illegible]i[illegible]s may infi[illegible]trat[illegible] su[illegible]surfac[illegible] soi[illegible] and groundwat[illegible]r [illegible]e[illegible]rof[illegible]ssiona[illegible]assistanc[illegible] may [illegible]e n[illegible]c[illegible]ssary to d[illegible]t[illegible]rmin[illegible] t[illegible]e [illegible]e[illegible]t[illegible]nt of su[illegible]surfac[illegible] im[illegible]act.

Car[illegible]fu[illegible]y contain and sto[illegible] t[illegible]e sourc[illegible] of t[illegible]e s[illegible]i[illegible], if saf[illegible] to do so. Prot[illegible]ct [illegible]odi[illegible]s of wat[illegible]r [illegible]y di[illegible]ing, a[illegible]sor[illegible]e[illegible]nts, or a[illegible]sor[illegible]e[illegible]nt [illegible]oom, if [illegible]ossi[illegible][illegible]. Do not f[illegible]us[illegible] down s[illegible]w[illegible]r or drainag[illegible] syst[illegible]ms, un[illegible]ss syst[illegible]m is d[illegible]sign[illegible]d and [illegible]e[illegible]rmitt[illegible]d to [illegible]and[illegible] suc[illegible] mat[illegible]ria[illegible]. T[illegible]e us[illegible] of fir[illegible] fig[illegible]ting foam may [illegible]e us[illegible]fu[illegible] in c[illegible]rtain situations to r[illegible]duc[illegible] va[illegible]ors. T[illegible]e [illegible]ro[illegible]e[illegible]r us[illegible] of wat[illegible]r s[illegible]ray may [illegible]e[illegible]ffectiv[illegible]y dis[illegible]e[illegible]rs[illegible] [illegible]roduct va[illegible]ors or t[illegible]e [illegible]i[illegible]uid its[illegible]f, [illegible]r[illegible]v[illegible]nting contact wit[illegible] ignition sourc[illegible]s or ar[illegible]as/[illegible]e[illegible]ui[illegible]m[illegible]nt t[illegible]at r[illegible]e[illegible]uir[illegible] [illegible]rot[illegible]ction.

Ta[illegible]e u[illegible] wit[illegible] sand or ot[illegible]er oi[illegible]a[illegible]sor[illegible]ing mat[illegible]ria[illegible]s. Car[illegible]fu[illegible]y s[illegible]ov[illegible], scoo[illegible] or sw[illegible][illegible]e u[illegible] into a wast[illegible] contain[illegible]r for r[illegible]c[illegible]amation or dis[illegible]osa[illegible]- caution, f[illegible]amma[illegible][illegible] va[illegible]ors may accumu[illegible]at[illegible] in c[illegible]os[illegible]d contain[illegible]rs. R[illegible]s[illegible]ons[illegible] and c[illegible]an-u[illegible] cr[illegible]ws must [illegible]e [illegible]ro[illegible]e[illegible]r[illegible]y train[illegible]d and must uti[illegible]i[illegible]e [illegible]ro[illegible]e[illegible]r [illegible]rot[illegible]ctiv[illegible] [illegible]e[illegible]ui[illegible]m[illegible]nt (s[illegible]e S[illegible]ction 8).

[illegible]e [illegible]ANDLIN[illegible] [illegible]e[illegible]e STO[illegible]A[illegible]E

[illegible]ANDLIN[illegible] [illegible]e[illegible]ECA[illegible]TIONS

Hand[illegible]e as a com[illegible]usti[illegible][illegible]e i[illegible]uid. [illegible]e[illegible]e[illegible] away from [illegible]e[illegible]at, s[illegible]ar[illegible]s, and o[illegible]e[illegible]n f[illegible]am[illegible][illegible]E[illegible]ctrica[illegible][illegible]e[illegible]ui[illegible]m[illegible]nt s[illegible]ou[illegible]d [illegible]e[illegible]a[illegible]e[illegible]rov[illegible]d for c[illegible]assifi[illegible]d ar[illegible]a. Bond and ground contain[illegible]rs during [illegible]roduct transf[illegible]r to r[illegible]duc[illegible] t[illegible]e [illegible]ossi[illegible]i[illegible]ity of static-initiat[illegible]d fir[illegible] or [illegible]e[illegible]e[illegible]osion.

Di[illegible]s[illegible]e[illegible]fu[illegible], and in [illegible]articu[illegible]ar [illegible]ow and u[illegible]tra [illegible]ow su[illegible]fur di[illegible]s[illegible]e[illegible]fu[illegible], [illegible]as t[illegible]e ca[illegible]a[illegible]i[illegible]ity of accumu[illegible]ating a static [illegible]e[illegible]ctrica[illegible]c[illegible]arg[illegible] of suffici[illegible]nt [illegible]n[illegible]rgy to caus[illegible] a fir[illegible]/[illegible]e[illegible]e[illegible]osion in t[illegible]e [illegible]r[illegible]s[illegible]nc[illegible] of [illegible]ow[illegible]r f[illegible]as[illegible]e[illegible]oint [illegible]roducts suc[illegible] as gaso[illegible]in[illegible]. T[illegible]e accumu[illegible]ation of suc[illegible] a static c[illegible]arg[illegible] occurs as t[illegible]e di[illegible]s[illegible]e[illegible]f[illegible]ows t[illegible]roug[illegible] i[illegible]e[illegible]in[illegible]s, fi[illegible]t[illegible]rs, no[illegible][illegible]e[illegible]s and various wor[illegible]tas[illegible]s suc[illegible] as tan[illegible]/contain[illegible]r fi[illegible]ing, s[illegible]as[illegible] [illegible]oading, tan[illegible] c[illegible]aning[illegible] [illegible]roduct sam[illegible]ing[illegible]tan[illegible] gauging[illegible]c[illegible]aning, mi[illegible]ing, vacuum truc[illegible] o[illegible]e[illegible]rations, switc[illegible] [illegible]oading, and [illegible]roduct agitation. T[illegible]e[illegible]r[illegible] is a gr[illegible]at[illegible]r [illegible]ot[illegible]ntia[illegible]for static c[illegible]arg[illegible] accumu[illegible]ation in co[illegible]d t[illegible]m[illegible]e[illegible]ratur[illegible], [illegible]ow [illegible]umidity conditions.

Docum[illegible]nts suc[illegible] as 29 CFR OSHA 1910.10[illegible][illegible] F[illegible]amma[illegible][illegible] and Com[illegible]usti[illegible][illegible] Li[illegible]uids, NFPA [illegible]e[illegible] R[illegible]comm[illegible]nd[illegible]d Practic[illegible] on Static E[illegible]ctricity, API 2003 [illegible]Prot[illegible]ction Against Ignitions Arising Out of Static, Lig[illegible]tning, and Stray Curr[illegible]nts and ASTM D48[illegible][illegible] [illegible]Standard Guid[illegible] for G[illegible]n[illegible]ration and Dissi[illegible]ation of Static

E[illegible]ctricity in P[illegible]tro[illegible]um Fu[illegible] Syst[illegible]ms [illegible]addr[illegible]ss s[illegible]cia[illegible]r[illegible]cautions and d[illegible]sign r[illegible]uir[illegible]m[illegible]nts invo[illegible]ving [illegible]oading rat[illegible]s, grounding, [illegible]onding, fi[illegible]t[illegible]r insta[illegible]ation, conductivity additiv[illegible]s and [illegible]s[illegible]cia[illegible]y t[illegible] [illegible]a[illegible]ards associat[illegible]d wit[illegible] [illegible]switc[illegible] [illegible]oading.[illegible] [illegible]Switc[illegible] Loading[illegible]is w[illegible]n a [illegible]ig[illegible]r fas[illegible] [illegible]oint [illegible]roduct (suc[illegible] as di[illegible]s[illegible]) is [illegible]oad[illegible]d into tan[illegible]s [illegible]r[illegible]vious[illegible]y containing a [illegible]ow fas[illegible] [illegible]oint [illegible]roduct (suc[illegible] as gaso[illegible]in[illegible]) and t[illegible] [illegible]lectrica[illegible] c[illegible]arg[illegible] g[illegible]n[illegible]rat[illegible]d during [illegible]oading of t[illegible] di[illegible]s[illegible]r[illegible]suits in a static ignition of t[illegible] va[illegible]or from t[illegible] [illegible]r[illegible]vious cargo (gaso[illegible]in[illegible]).[illegible]

Not[illegible]: W[illegible]n conductivity additiv[illegible]s ar[illegible] us[illegible]d or ar[illegible] n[illegible]c[illegible]ssary t[illegible] [illegible]roduct s[illegible]ou[illegible]d ac[illegible]i[illegible]v[illegible] 2[illegible] [illegible]icosi[illegible]m[illegible]ns/m[illegible]t[illegible]r or gr[illegible]at[illegible]r at t[illegible] [illegible]and[illegible]ing t[illegible]m[illegible]ratur[illegible].

STO[illegible]A[illegible]E [illegible][illegible]ECA[illegible]TIONS
[illegible][illegible]away from f[illegible]am[illegible], s[illegible]ar[illegible]s, [illegible][illegible]c[illegible]ssiv[illegible] t[illegible]m[illegible][illegible]ratur[illegible]s and o[illegible][illegible]n f[illegible]am[illegible]. Us[illegible] a[illegible][illegible]rov[illegible]d v[illegible]nt[illegible]d contain[illegible]rs. [illegible][illegible]Store contain[illegible]rs c[illegible]os[illegible]d and c[illegible]ar[illegible]y [illegible]a[illegible][illegible]l[illegible]d. Em[illegible]ty [illegible]roduct contain[illegible]rs or v[illegible]ss[illegible]s may contain [illegible][illegible]losiv[illegible] va[illegible]ors. Do not [illegible]r[illegible]ssuri[illegible], cut, [illegible]eat, w[illegible]d or [illegible][illegible]os[illegible] suc[illegible] contain[illegible]rs to sourc[illegible]s of ignition.

Stor[illegible] in a w[illegible]-v[illegible]nti[illegible]at[illegible]d ar[illegible]a. T[illegible]is storag[illegible] ar[illegible]a s[illegible]ou[illegible]d com[illegible]y wit[illegible] NFPA 30 [illegible]Fi[illegible]amma[illegible][illegible] and Com[illegible]usti[illegible][illegible] Li[illegible]uid Cod[illegible]. Avoid storag[illegible] n[illegible]ar incom[illegible]ati[illegible][illegible] mat[illegible]ria[illegible]s. T[illegible] c[illegible]aning of tan[illegible]s [illegible]r[illegible]viously containing t[illegible]is [illegible]roduct s[illegible]ou[illegible]d fo[illegible]ow API R[illegible]comm[illegible]nd[illegible]d Practic[illegible] (RP) 2013 [illegible]C[illegible]aning Mo[illegible]i[illegible] Tan[illegible]s In Fi[illegible]amma[illegible][illegible] and Com[illegible]usti[illegible][illegible] Li[illegible]uid S[illegible]rvic[illegible] and API RP 201[illegible] [illegible]C[illegible]aning P[illegible]tro[illegible]um Storag[illegible] Tan[illegible]s.

[illegible] O[illegible][illegible][illegible][illegible]IENIC [illegible][illegible]ACTICES
Em[illegible]rg[illegible]ncy [illegible]y[illegible] was[illegible] ca[illegible]a[illegible]ility s[illegible]ou[illegible]d [illegible][illegible] avai[illegible]a[illegible][illegible] in t[illegible] n[illegible]ar [illegible]ro[illegible]imity to o[illegible][illegible]rations [illegible]r s[illegible]nting a [illegible]ot[illegible]ntia[illegible]s[illegible]as[illegible] [illegible][illegible][illegible]osur[illegible]. Us[illegible] good [illegible][illegible]rsona[illegible][illegible]ygi[illegible]n[illegible] [illegible]ractic[illegible]s. Avoid r[illegible][illegible]at[illegible]d and/or [illegible]ro[illegible]ong[illegible]d s[illegible]in [illegible][illegible]osur[illegible]. Was[illegible] [illegible]ands [illegible][illegible]for[illegible] [illegible]ating, drin[illegible]ing, smo[illegible]ing, or using toi[illegible][illegible]t faci[illegible]iti[illegible]s. Do not us[illegible] as a c[illegible]aning so[illegible]v[illegible]nt on t[illegible] s[illegible]in. Do not us[illegible] so[illegible]v[illegible]nts or [illegible]ars[illegible] a[illegible]rasiv[illegible] s[illegible]in c[illegible]an[illegible]rs for was[illegible]ing t[illegible]is [illegible]roduct from [illegible][illegible]os[illegible]d s[illegible]in ar[illegible]as. Wat[illegible]r[illegible]ss [illegible]and c[illegible]an[illegible]rs ar[illegible] [illegible]ff[illegible]ctiv[illegible]. Prom[illegible]t[illegible]y r[illegible]mov[illegible] contaminat[illegible]d c[illegible]ot[illegible]ing and [illegible]aund[illegible]r [illegible][illegible]for[illegible]r us[illegible]. Us[illegible] car[illegible] w[illegible]n [illegible]aund[illegible]ring to [illegible]r[illegible]v[illegible]nt t[illegible] formation of fi[illegible]amma[illegible][illegible] va[illegible]ors w[illegible]ic[illegible] cou[illegible]d ignit[illegible] via was[illegible]r or dry[illegible]r. Consid[illegible]r t[illegible] n[illegible][illegible]d to discard contaminat[illegible]d [illegible]at[illegible]r s[illegible]o[illegible]s and g[illegible]ov[illegible]s.

[illegible][illegible] E[illegible][illegible]OS[illegible][illegible]E CONT[illegible]OLS [illegible][illegible] [illegible]E[illegible]SONAL [illegible][illegible]OTECTION

E[illegible][illegible]OS[illegible][illegible]E LI[illegible]ITS

C[illegible] [illegible][illegible][illegible][illegible][illegible] CAS N[illegible][illegible]	S[illegible][illegible][illegible][illegible]	E[illegible][illegible][illegible][illegible][illegible][illegible] L[illegible][illegible] [illegible][illegible] T[illegible] A[illegible]STEL	N[illegible][illegible]
Di[illegible]s[illegible] Fu[illegible]: ([illegible]84[illegible][illegible]-34-[illegible])	OSHA ACGIH	[illegible] mg/m, as min[illegible]ra[illegible]oi[illegible] mist 100 mg/m^3 (as tota[illegible]y [illegible]ydrocar[illegible]on va[illegible]or) TWA	 A3, s[illegible]in
Na[illegible][illegible]t[illegible]a[illegible][illegible]n[illegible] (91-20-3)	OSHA ACGIH	10 [illegible][illegible]m TWA 10 [illegible][illegible]m TWA / 1[illegible] [illegible][illegible]m STEL	 A4, S[illegible]in

EN[illegible]INEE[illegible]IN[illegible] CONT[illegible]OLS
Us[illegible] ad[illegible][illegible]uat[illegible] v[illegible]nti[illegible]ation to [illegible][illegible][illegible]l[illegible] va[illegible]or conc[illegible]ntrations of t[illegible]is [illegible]roduct [illegible][illegible]ow occu[illegible]ationa[illegible][illegible][illegible]osur[illegible] and fi[illegible]amma[illegible]ility [illegible]imits, [illegible]articu[illegible]ar[illegible]y in confin[illegible]d s[illegible]ac[illegible]s.

E[illegible]E[illegible]ACE [illegible][illegible]OTECTION
Saf[illegible]ty g[illegible]ass[illegible]s or gogg[illegible]s ar[illegible] r[illegible]comm[illegible]nd[illegible]d w[illegible]r[illegible] t[illegible]r[illegible] is a [illegible]ossi[illegible]ility of s[illegible]as[illegible]ing or s[illegible]raying.

S[illegible]IN [illegible][illegible]OTECTION
G[illegible]ov[illegible]s construct[illegible]d of nitri[illegible], n[illegible]o[illegible]r[illegible]n[illegible], or PVC ar[illegible] r[illegible]comm[illegible]nd[illegible]d. C[illegible][illegible]mica[illegible][illegible] rot[illegible]ctiv[illegible] c[illegible]ot[illegible]ing suc[illegible] as of E.I. DuPont TyC[illegible][illegible]m[illegible], Saran[illegible][illegible] or [illegible][illegible]uiva[illegible]nt r[illegible]comm[illegible]nd[illegible]d [illegible]as[illegible]d on d[illegible]gr[illegible][illegible] of [illegible][illegible][illegible]osur[illegible]. Not[illegible]: T[illegible] r[illegible]sistanc[illegible] of s[illegible][illegible]cific mat[illegible]ria[illegible] may vary from [illegible]roduct to [illegible]roduct as w[illegible][illegible]as wit[illegible] d[illegible]gr[illegible][illegible] of [illegible][illegible][illegible]osur[illegible]. Consu[illegible]t manufactur[illegible]r s[illegible][illegible]cifications for furt[illegible][illegible]r information.

MATERIAL SAFETY DATA SHEET

D[illegible] A[illegible] T[illegible] **SDS N[illegible]**

ES I ATO OTECTION

A NIOSH/MSHA-a rov d air- urifying r s irator wit organic va or cartridg s or canist r may rmissi und r c rtain circumstanc s w r air orn conc ntrations ar or may c d osur imits or for odor or irritation. Prot ction rovid d y air- urifying r s irators is imit d. R f r to OSHA 29 CFR 1910.134, NIOSH R s irator D cision Logic, and t manufactur r for additiona guidanc on r s iratory rot ction s ction.

Us a ositiv r ssur , air-su i d r s irator if t r is a ot ntia for uncontro d r as , osur v s ar not nown, in o yg n-d fici nt atmos r s, or any ot r circumstanc w r an air- urifying r s irator may not rovid ad uat rot ction.

SICAL C E ICAL O E TIES

A EA ANCE

C ar, straw-y ow i uid. Dy d fu oi wi r d or r ddis -co or d.

ODO

Mi d, tro um disti at odor

ASIC SICAL O E TIES

BOILING RANGE:	320 to 90 oF (1 0 to 3 °C)
VAPOR PRESSURE:	0.009 sia 0 °F (21 °C)
VAPOR DENSITY (air 1):	1.0
SPECIFIC GRAVITY (H_2O 1):	0.83 to 0.88 0 °F (1 °C)
PERCENT VOLATILES:	100
EVAPORATION RATE:	S ow vari s wit conditions
SOLUBILITY (H_2O):	N g igi

STA ILIT EACTI IT

STA ILIT Sta . Ha ardous o ym ri ation wi not occur.

CONDITIONS TO A OID INCO ATI LE ATE IALS

Avoid ig t m ratur s, o n fam s, s ar s, w ding, smo ing and ot r ignition sourc s. away from strong o idi rs Viton F uor

A A DO S DECO OSITION OD CTS

Car on mono id , car on dio id and non-com ust d ydrocar ons (smo).

TO ICOLO ICAL O E TIES

AC TE TO ICIT

Acut d rma LD 0 (ra its): m/ g
Acut ora LD 0 (rats): 9 m/ g
Primary d rma irritation: tr m y irritating (ra its)
Drai y irritation: non-irritating (ra its)
Guin a ig s nsiti ation: n gativ

C ONIC E ECTS AND CA CINO ENICIT

Carcinog nic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

Studi s av s own t at simi ar roducts roduc s in tumors in a oratory anima s fo owing r at d a ications wit out was ing or r mova . T significanc of t is finding to uman osur as not n d t rmin d. Ot r studi s wit activ s in carcinog ns av s own t at was ing t anima s s in wit soa and wat r tw n a ications r duc d tumor formation.

TA ENICIT [illegible]

T is mat ria as n ositiv in a mutag nicity study.

MATERIAL SAFETY DATA SHEET

D□□□□□□□□□A□T□□□□□ **□SDS N□□□□□□**

□□□ ECOLO□ICAL IN□O□□ATION

□□□□ out of s□w□rs, drainag□ ar□as, and wat□rways. R□□ort s□i□s and r□□as□s, as a□□ica□□, und□r F□d□ra□and Stat□ r□gu□ations.

□3□ DIS□OSAL CONSIDE□ATIONS

Consu□t f□d□ra□, stat□ and □oca□ wast□ r□gu□ations to d□t□rmin□ a□□ro□riat□ dis□osa□ o□tions.

□□□ T□ANS□O□TATION IN□O□□ATION

PROPER SHIPPING NAME: Di□s□□ Fu□□
HAZARD CLASS and PAC□ING GROUP: 3, PG III
DOT IDENTIFICATION NUMBER: NA 1993 (Dom□stic)
UN 1202 (Int□rnationa□)
DOT SHIPPING LABEL: Non□

P□acard (Int□rnationa□ On□y):

Us□ Com□usti□□ P□acard if s□i□□ing in □u□ dom□stica□y

□□□ □E□□LATO□□ IN□O□□ATION

□S□□EDE□AL□STATE□□□□ LOCAL □E□□LATO□□ IN□O□□ATION

T□is □roduct and its constitu□nts □ist□d □□r□in ar□ on t□□ EPA TSCA Inv□ntory. Any s□i□or uncontro□□d r□□as□ of t□is □roduct, inc□uding any su□stantia□ t□r□at of r□□as□, may □□ su□□□ct to f□d□ra□, stat□ and/or □oca□ r□□orting r□□uir□m□nts. T□is □roduct and/or its constitu□nts may a□so □□ su□□□ct to ot□□r r□gu□ations at t□□ stat□ and/or □oca□□v□□. Consu□t t□os□ r□gu□ations a□□ica□□□ to your faci□ity/o□□ration.

CLEAN □ ATE□ ACT □OIL S□ILLS□

Any s□i□or r□□as□ of t□is □roduct to □naviga□□□ wat□rs□(□ss□ntia□y any surfac□ wat□r, inc□uding c□rtain w□t□ands) or ad□oining s□or□in□s suffici□nt to caus□ a visi□□ s□□□n or d□□osit of a s□udg□ or □mu□sion must □□ r□□ort□d imm□diat□y to t□□ Nationa□R□s□ons□ C□nt□r (1-800-424-8802) as r□□uir□d □y U.S. F□d□ra□Law. A□so contact a□□ro□riat□ stat□ and □oca□r□gu□atory ag□nci□s as r□□uir□d.

CE□CLA SECTION □□3 □□□ SA□A SECTION 3□□ □□ELEASE TO T□E EN□I□ON□ENT□

T□□ CERCLA d□finition of □a□ardous su□stanc□s contains a □□□tro□□um □□c□usion□c□aus□ w□ic□ □□□m□ts crud□ oi□, r□fin□d, and unr□fin□d □□tro□□um □roducts and any indig□nous com□on□nts of suc□. How□v□r, ot□□r f□d□ra□r□□orting r□□uir□m□nts (□.g., SARA S□ction 304 as w□□as t□□ C□□an Wat□r Act if t□□ s□i□□ occurs on naviga□□□ wat□rs) may sti□□a□□y.

SA□A SECTION 3□□3□□ □□A□A□D CLASSES

AC□TE □EALT□	C□□ONIC □EALT□	□I□E	S□DDEN □ELEASE O□ □□ESS□□E	□EACTI□E
□	□	□	□□	□□

SA□A SECTION 3□3 □S□□□LIE□ NOTI□ICATION

T□is □roduct may contain □ist□d c□□mica□s □□ow t□□ *de minimis* □v□□s w□ic□ t□□r□for□ ar□ not su□□□ct to t□□ su□□i□r notification r□□uir□m□nts of S□ction 313 of t□□ Em□rg□ncy P□anning and Community Rig□t-To-□now Act (EPCRA) of 198□ and of 40 CFR 3□2. If you may □□ r□□uir□d to r□□ort r□□as□s of c□□mica□s □ist□d in 40 CFR 3□2.28, you may contact H□ss Cor□orat□ Saf□ty if you r□□uir□ additiona□ information r□garding t□is □roduct.

CALI□O□NIA □□O□OSITON □□ LIST O□ C□E□ICALS

T□is □roduct contains t□□ fo□owing c□□mica□s t□at ar□ inc□ud□d on t□□ Pro□osition □□ □List of C□□mica□s□ r□□uir□d □y t□□ Ca□ifornia Saf□ Drin□ing Wat□r and To□ic Enforc□m□nt Act of 198□:

IN□□EDIENT NA□E (CAS NUMBER)	D□□□ L□□□□□
Di□s□□Engin□ E□□aust (no CAS Num□□r □ist□d)	10/01/1990

CANADIAN □E□□LATO□□ IN□O□□ATION □□ □□IS□

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MATERIAL SAFETY DATA SHEET

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ACGIH	Am□rican Conf□r□nc□ of Gov□rnm□nta□ Industria□Hygi□nists
AIHA	Am□rican Industria□Hygi□n□ Association
ANSI	Am□rican Nationa□Standards Institut□ (212) □42-4900
API	Am□rican P□tro□□um Institut□ (202) □82-8000
CERCLA	Com□r□□□nsiv□ Em□rg□ncy R□s□ons□, Com□□nsation, and Lia□i□ity Act
DOT	U.S. D□□artm□nt of Trans□ortation □G□n□ra□info: (800) 4□□-4922□
EPA	U.S. Environm□nta□Prot□ction Ag□ncy
HMIS	Ha□ardous Mat□ria□s Information Syst□m
IARC	Int□rnationa□Ag□ncy For R□s□arc□ On Canc□r
MSHA	Min□ Saf□ty and H□a□t□ Administration
NFPA	Nationa□Fir□ Prot□ction Association (□1□)□□0-3000
NIOSH	Nationa□Institut□ of Occu□ationa□Saf□ty and H□a□t□
NOIC	Notic□ of Int□nd□d C□ang□ (□ro□os□d c□ang□ to ACGIH TLV)
NTP	Nationa□To□ico□ogy Program
OPA	Oi□Po□□ution Act of 1990
OSHA	U.S. Occu□ationa□Saf□ty & H□a□t□ Administration
PEL	P□rmissi□□ E□□osur□ Limit (OSHA)
RCRA	R□sourc□ Cons□rvation and R□cov□ry Act
REL	R□comm□nd□d E□□osur□ Limit (NIOSH)
SARA	Su□□rfund Am□ndm□nts and R□aut□ori□ation Act of 198□ Tit□□ III
SCBA	S□f-Contain□d Br□at□ing A□□aratus
SPCC	S□i□Pr□v□ntion, Contro□, and Count□rm□asur□s
STEL	S□ort-T□rm E□□osur□ Limit (g□n□ra□y 1□minut□s)
TLV	T□r□s□o□d Limit Va□u□ (ACGIH)
TSCA	To□ic Su□stanc□s Contro□Act
TWA	Tim□ W□ig□t□d Av□rag□ (8 □r.)
WEEL	Wor□□ac□ Environm□nta□E□□osur□ L□v□□(AIHA)
WHMIS	Canadian Wor□□ac□ Ha□ardous Mat□ria□s Information Syst□m

DISCLAIMER OF E□PRESSED AND IMPLIED WARRANTIES

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Appendix B

Quality Assurance Plan Addendum

Imagine the result

US Army Corps of Engineers
Baltimore District

INTERNAL DRAFT

QUALITY ASSURANCE PLAN ADDENDUM

PERFORMANCE BASED PROJECT (PBC)

Prepared for:

Radford Army Ammunition Plant

APRIL 2008

ARCADIS
Infrastructure, environment, facilities

INTERNAL DRAFT

Quality Assurance Plan Addendum Performance Based Contract (PBC)

Radford Army Ammunition Plant,
Radford, Virginia

April 2008

Jane Kennedy
Project Chemist

Kurt Beil
Quality Assurance Manager

Tim Llewellyn
Project Manager

Quality Assurance Plan Addendum
Performance Based Contract (PBC)

Radford Army Ammunition Plant,
Radford, Virginia

ENVIRONMENT

Prepared for:
Radford Army Ammunition Plant

Prepared by:
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Fax 410.987.4392

Our Ref.:
GP08RAAP.C000.CC008

Date:
April 14, 2008

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Title and Approval Page

Site Name/Project Name: Radford Army Ammunition Plant
Site Location: Radford, Virginia

Quality Assurance Plan Addendum for PBC2

Document Title

USEPA Region III and Virginia Department of Environmental Quality

Lead Organization

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Preparer's Address, Telephone Number, and E-mail Address

April 15, 2008

Preparation Date (Day/Month/Year)

Approval Signatures

Contract Officers Representative: _____
Signature

Tom Meyer/ US Army Corps of Engineers
April 15, 2008
Printed Name/Organization/Date

VDEQ Federal Facilities Project Manager: _____
Signature

Jim Cutler / VDEQ /April 15, 2008
Printed Name/Organization/Date

USEPA RCRA Project Manager: _____
Signature

William Geiger / USEPA Region 3 / April 15, 2008
Printed Name/Organization/Date

ATK Environmental Lead: _____
Signature

Jerome Redder / ATK / April, 2008
Printed Name/Title/Date

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A Quality Assurance Manual Empirical Laboratory

B Quality Assurance Manual Air Toxics Laboratory

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List of Acronyms and Abbreviations

ATK	Alliant Techsystems
ASTM	American Society of Testing Materials
BDDT	Building Debris Disposal Trench
BLA	Bag Loading Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain-of-Custody
COD	Chemical Oxygen Demand
DOD	Department of Defense
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EQuIS	Environmental Quality Information Systems
FHSO	Field Health and Safety Officer
FRA	Field Readiness Assessment
ft	Feet
g	Gram
GC	Gas Chromatography
GO/CO	Government-Owned Contractor-Operated
GW	Groundwater
HSA	Horseshoe Area
HASP	Health and Safety Plan
HSPA	Health and Safety Plan Addendum
HSWA	Hazardous and Solid Waste Amendments
IAA	Igniter Assembly Area
ICP	Inductively Coupled Plasma

List of Acronyms and Abbreviations Continued

IRP	Installation Restoration Program
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MHSP	Master Health and Safety Plan
MMA	Main Manufacturing Area
MQAP	Master Quality Assurance Plan
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Monitoring Well
MWP	Master Work Plan
NBG	Northern Burning Ground
NCP	Natural Oil and Hazardous Substances Contingency Plan
NELAP	National Environmental Laboratory Accreditation Program
NFA	No Further Action
NFG	National Functional Guidelines
NIST	National Institute of Standards and Technology
NRU	New River Unit
PBC	Performance Based Contract
PM	Project Manager
PMP	Project Manager Plan
QA	Quality Assurance
QC	Quality Control
QA/QC	Quality Assurance/Quality Control
QAM	Quality Assurance Manual
QAP	Quality Assurance Plan
QAPA	Quality Assurance Plan Addendum
R	Rinse Blank

List of Acronyms and Abbreviations Continued

RAAP	Radford Army Ammunition Plant
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RL	Reporting Limit
RY	Rail Yard
SARA	Superfund Amendments and Reauthorization Act
SOP	Standard Operating Procedure
SVOC	Semi-volatile Organic Compound
SWMU	Solid Waste Management Unit
TB	Trip Blank
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TM	Task Manager
TNT	Trinitrotoluene
TOC	Total Organic Carbon
TSDF	Treatment, Storage, and Disposal Facility
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VPDES	Virginia Permitted Discharge Elimination System
VOC	Volatile Organic Compound
WBG	Western Burning Ground

Quality Assurance Plan Addendum
Performance Based Contract (PBC)

Radford Army Ammuntition Plant, Radford, Virginia

1. Introduction and Background

This Quality Assurance Plan Addendum (QAPA) describes the project background and quality assurance (QA) mechanisms that will be implemented to ensure that usable data will be generated during the project execution for the Performance Based Contract (PBC) awarded to ARCADIS associated with the environmental restoration program at Radford Army Ammunition Plant (RAAP) Radford, Virginia. Work will be conducted under contract W91ZLK-05-D-0015: Task 0002. This is the second PBC contract awarded for RAAP, and is thus referred to as PBC2.

This Quality Assurance Plan Addendum (QAPA) is prepared in conjunction with the Master Work Plan (MWP) and the Master Quality Assurance Plan (MQAP) to address the PBC2 specific responsibilities and authorities that will be implemented during supplemental investigative and remediation activities. The project objectives will be met through the execution of the Standard Operating Procedure (SOP) included in the MWP, or as appended to this document and site, or area specific work plans.

The Installation Restoration Program (IRP) activities at RAAP operate in accordance with the provisions of the Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984 at the Main Manufacturing Area (MMA), and the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), and the Natural Oil and Hazardous Substances Contingency Plan (NCP) at the New River Unit (NRU). The U.S. Environmental Protection Agency (USEPA) issued a final Hazardous Waste Management Permit – Part II (Part II Permit) to RAAP in September 2000. This permit addresses the corrective action requirements for all Solid and Hazardous Waste Management Units (SWMUs) at RAAP.

1.1 Project Scope and History

This QAPA supports the environmental restoration of RAAP sites identified in the PBC2 contract. The goal of this PBC is to meet the requirements for all sites, as defined in the contract and summarized in the Project Management Plan (PMP) (ARCADIS, 2008). The full scope of services for this contract is defined in PBC2. All work performed under this contract will be consistent with all applicable regulatory requirements, and relevant Department of Defense (DoD) and Army policy.

1.2 Site Location and History

The MMA is an industrial area with ongoing propellant manufacturing operations. The MMA is regulated under a RCRA permit finalized in 2000, to be renegotiated in 2010. The MMA areas addressed in this Project Management Plan (PMP) include two distinct sites, SWMU 31 (RAAP-026) and RAAP-031, and two related sites, RAAP-042 and -047. Sites RAAP-042 and -047 are related by a persistent, low-level trichloroethene (TCE) groundwater (GW) plume from an unsubstantiated source. RAAP-042 is a closed surface impoundment measuring approximately 100 ft x 150 ft. The impoundment (HWMU #5) was first used in 1970. It was unlined until 1981, when a liner was added. It was taken out of operation in 1986 and closed in 1989. During operation, the impoundment received storm water runoff, spill and washdown water from the neutralization from the acid tank farm (nitric and sulfuric acids). Before 1983, some wastewater also contained nitrocellulose. RAAP-047 is a high-security active manufacturing section of the South Bank MMA. The area is on a river terrace which slopes northward down toward the New River. The river is greater than 3,000 feet away and approximately 100 to 150 ft lower in elevation.

SWMU-31 (RAAP-026) is located in the MMA, in the northwest section of the HSA. The New River flows from northeast to southwest along the northern boundary of SWMU-31. The site consists of three connected, unlined settling lagoons which accepted effluent from Power House No. 2 until the 1980s. The lagoons are presently operational, accepting effluent from the water treatment plant. The effluent consists of overflow from drinking water settling tanks and backwash from filter cleaning. The lagoons are arranged sequentially, with the primary lagoon directly accepting effluent and subsequently discharging to the secondary and tertiary lagoons. Effluent from the secondary and tertiary lagoons is regulated under a Virginia Permitted Discharge Elimination System (VPDES) permit. RAAP-031 consists of 0.045 acres located near the nitrocellulose A-line production area. A shallow concrete ditch approximately 2-ft wide runs through the site at the base of a grassy bank.

The NRU comprises more than 2,800 acres and is located approximately 6 miles from the MMA. An initial phase of remedial investigation has been completed at the site, which led to the identification of six individual areas within the greater unit requiring additional characterization and possible remediation: the Building Debris Disposal Trench (BDDT), the Bag Loading Area (BLA); the Igniter Assembly Area (IAA), the Rail Yard (RY), the Northern Burning Ground (NBG), and the Western Burning Ground (WBG). These six sites span an area of approximately 800 acres. The NRU is

managed under CERCLA, which allows for consideration of the NRU as one site with six internal areas of concern.

1.3 Status of Environmental Restoration Program

Remediation at the MMA is being conducted pursuant to RCRA Corrective Action requirements with regulatory coordination, as appropriate, with the Virginia Department of Environmental Quality (VDEQ) and the USEPA Region III. The Commonwealth of Virginia received RCRA corrective action authority in 2000 but in conjunction with the USEPA-State corrective action transition process, remediation is currently being coordinated consistent with the Permit for Corrective Action and Waste Minimization pursuant to RCRA as amended by the Hazardous Waste and Solid Waste Amendments of 1984 issued in September 2000 by USEPA (Permit Number VA1210020730). This permit will be renegotiated with VDEQ in 2010, at which time the contractor will be required to comply with the new permit. RAAP has separate permits issued by the Commonwealth of Virginia that manage the treatment, storage, and disposal facility (TSDF) operations pertaining to RCRA Subtitle C, D, and Subpart X. The Commonwealth of Virginia has also issued a post-closure care permit for closed HWMUs listed in the RCRA operating permit.

Work is being conducted at the NRU under CERCLA with the VDEQ in the lead regulatory role and the U.S. Army as the lead Federal Agency.

2. Master Quality Assurance Plan

The MQAP was prepared as a site-wide planning document (URS, 2003). The QAPA is designed to be used in conjunction with the MQAP for work conducted by ARCADIS. It specifies field and laboratory procedures that will be used in support of the investigation, delineation, and remediation activities. This document has been prepared in accordance with USEPA *Requirements for Quality Assurance Project Plans for Environmental Data Operations*, EPA QA/R-5 (March 2001); *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA/240/R-02/009 (December 2002); and the REGION III QAPP Preparation Checklist (USEPA Region III, 2001)

The available SOPs previously published in are listed in Table 2-1. Specific quality control (QC) requirements include development of Data Quality Objectives (DQOs), performance of internal QC checks, and execution of appropriate analytical procedures during investigative and remedial activities are presented herein.

Applicable ARCADIS SOPs will be included in site specific work plan addenda. If an SOP for an activity is necessary and has not previously been referenced, the SOP will be prepared as necessary.

3. Document Distribution

The distribution list for all submittals is presented in the PMP. In addition to the standard document submittal list, the QAPA will also be provided to the entities identified below.

QAPA Supplemental Distribution List	Address
Kurt Beil, PE ARCADIS Quality Assurance Manager	ARCADIS 6 Terry Drive Suite 300 Newtown, PA 18940 Tel : 267.685.1800
Jane Kennedy ARCADIS Project Chemist	ARCADIS US 3850 N. Causeway Blvd. Suite 1600 Metairie, LA 70002 Tel: 504.832.4174
Marcia McGinnity Empirical Laboratories Project Manager	Empirical Laboratories, LLC 227 French Landing Dr. Suite 550 Nashville, TN 37228
Brandon Dunmore Air Toxics Project Manager	Air Toxics, Inc. 180-B Blue Ravine Road Folsom, CA 95630
ARCADIS Field Operations Manager	Prior to initiation of field operations

4. Project Organization and Responsibilities

4.1 Project Organization

The ARCADIS organizational chart for PBC2 is presented on Figure 4-1. The Project Manager (PM), Task Managers (TM)s, and Field Operations Managers are primarily responsible for the implementation of the QA program.

The primary USEPA and VDEQ personnel involved with this project include the following:

- William Geiger: USEPA RCRA PM - who will provide oversight and other additional duties; and

- Jim Cutler: VDEQ PM - who will provide oversight and perform other additional duties.

The specific QA responsibilities of the key ARCADIS project personnel and subcontractors are described below.

4.2 ARCADIS Staff

This section describes the roles and responsibilities of the ARCADIS project team members.

4.2.1 Project Manager

For the RAAP project, Mr. Tim Llewellyn will be the PM. Mr. Llewellyn will assign the Task Managers and oversee the implementation of all schedules and budgets. He will establish and interpret PBC2 contract policies and procedures and access appropriate ARCADIS resources in order to maintain technical quality. Mr. Llewellyn will coordinate with the ARCADIS Federal Programs Manager (Ms. Lee Ann Smith) and ARCADIS Technical Advisors on issues that impact the overall quality of ARCADIS' performance on the contract.

The PM is responsible for distributing documents to the U.S. Army, USEPA, VDEQ, and Task Managers who in turn distribute it to the appropriate technical staff. Additional information regarding responsibilities of the PM is provided in the PMP.

4.2.2 Deputy Project Manager

Ms. Diane Wisbeck will support the PM in contract management as well as task implementation, document preparation, personnel coordination, and budget management. Ms. Wisbeck will perform a key role in ensuring compliance with quality performance objectives. She will identify required resources and initiate acquisition of appropriate assets to complete project requirements. She will coordinate operations to ensure compliance with the project schedules. Ms. Wisbeck with also track project budges assist with quality program implementation and coordinate document preparation and submittal.

4.2.3 Task Project Managers

The Task Managers (TMs) will be responsible for the overall quality of work performed under PBC2 as it relates to the following specific roles:

- Overseeing day-to-day of task performance including all technical and administrative operations;
- Performing assessment and oversight duties as described in the PMP, MQAP and QAPA;
- Selecting and monitoring technical staff;
- Managing the development of area specific Work Plans;
- Reviewing and approving all final reports and other work products; and
- Distributing the QAPA to the ARCADIS technical staff.

TMs are as follows:

- Mr. Christopher Sharp; and
- Mr. Chris Kalinowski.

4.2.4 QA Manager

The Corporate QA Manager for the RAAP project, Mr. Kurt Beil, is responsible for oversight of all QA/QC activities. He will remain independent of day-to-day direct project involvement, but will have the responsibility for ensuring that all project and task-specific QA/QC requirements are met. He will have direct access to corporate staff, as necessary, to resolve any QA/QC problems, disputes, or deficiencies. The QA Manager's duties include:

- Reviewing and approving the QAPA and site-specific Work Plans;
- Reviewing and approving substantive changes to the QAPA and site-specific Work Plans;
- Reviewing any new work orders with the PM to determine if the QAPA requires; and
- Conducting field audits, as appropriate, in conjunction with the corporate QA office and keeping written records of those audits.

4.2.5 Health and Safety Manager

Mr. Charles Webster will serve as the project Health and Safety Manager. The Health and Safety Manager will review and internally approve the Health and Safety Plan Addendum (HSPA) that will be designed to the specific needs and operations associated with PBC2. In consultation with the PM, the Health and Safety Manager will ensure that an adequate level of personal protection exists for anticipated potential hazards for field personnel. On-site health and safety will be the responsibility of the Field Health and Safety Officer (FHSO). The FHSO will work in coordination with the PM and the project Health and Safety Manager to ensure that all activities are conducted safely and in accordance with the HSPA as well as facility requirements.

4.2.6 Project Chemist

The RAAP Project Chemist, Ms. Jane Kennedy, is responsible for data validation and verification, the generation of QC reports, and oversight of analytical laboratories. The Project Chemist's specific duties include:

- Developing the project QAPA and QA aspects of site specific Work Plans;

- Providing external review of analytical activities by performance of assessment and oversight duties as appropriate;

- Coordinating with the PM, Site TM's, and laboratory management to ensure that QA objectives appropriate to the project are set and that laboratory and field personnel are aware of these objectives;

- Reporting nonconformance with either QC criteria or QA objectives to the appropriate managers including recommending, implementing, and/or reviewing corrective actions;

- Conducting definitive analytical data evaluation and review to provide information on data limitations based on specific QC criteria; and

- Establishing that data meet the project technical, QC criteria, assessing the usability and extent of bias of data not meeting the specific technical, and quality criteria.

4.2.7 Field Operations Leaders

The Field Operations Leaders will be determined based on the specific field activities to be performed. The Field Operations Leader is responsible for coordinating the categories of work such as GW sampling, monitor well installation, well development, soil borings, and sampling. The Field Operations Leader will also be responsible for the assignment of on-site personnel and for providing technical assistance when required. The Field Operations Leader is responsible for ensuring that technical matters pertaining to the field-sampling program are addressed. He will ensure that work is being conducted as specified in the technical plans.

In addition, the Field Operations Leader is responsible for field quality assurance / quality control (QA/QC) procedures and for safety-related issues. The Field Operations Leader will coordinate all sampling activities and will ensure the availability and maintenance of all sampling materials/equipment. The Field Operations Leader or his designee will be responsible for the completion of all sampling and chain-of-custody (COC) documentation and will ensure custody of all samples is appropriately maintained.

Prior to initiation of field activities, the Field Operations Leader will utilize a copy of the MQAP and this QAPA with applicable SOPs and other project documents to conduct a

field staff orientation and briefing to acquaint project personnel with the sites and assign field responsibilities.

4.2.8 Technical Staff

The technical staff for this program will be drawn from a pool of technical resources within ARCADIS. The technical staff will implement project and site tasks, analyze data, and prepare reports/support materials. All technical personnel assigned will be experienced professionals who possess the degree of specialization and technical competence required to perform the required work effectively and efficiently. All technical staff will be familiar with the Master Health and Safety Plan (MHSP) and the ARCADIS HSPA as well as all relevant work plans, SOPs, and policies applicable to the fieldwork performed. Each field sampling team will have a copy of the HSPA, and area specific Work Plans in their possession while conducting fieldwork.

4.3 Subcontractors

4.3.1 Laboratories

Independent laboratories providing analytical services will be utilized, as appropriate, for the various project requirements including confirmation sampling, routine monitoring, and pilot/benchscale studies. Analytical chemistry laboratories shall be accredited, under the National Environmental Laboratory Accreditation Program (NELAP) for the analytical parameters required for the project for which accreditation is available through the primary accrediting state. The laboratory QA programs will be reviewed and approved by the ARCADIS Project Chemist. The laboratory will assign an experienced PM to coordinate analytical support with the project chemistry team. The laboratory staff will include a qualified QA Manager/Coordinator, who reports directly to laboratory management independently of the technical operations of the laboratory, to oversee technical adherence to the laboratory QA programs and the RAAP MQAP and QAPA. The specific duties of the laboratory PM and QA Manager/Coordinator for the RAAP analyses include:

- Reviewing the RAAP MQAP, QAPA, and area specific Work Plans to verify that analytical operations will meet project requirements as defined in the RAAP documents;

- Documenting and implementing RAAP-specific QA/QC requirements in the laboratory and reviewing analytical data (10 percent for the QA Officer) to verify the requirements were met;

- Reviewing receipt of all sample shipments and notifying the Site Manager and Project Chemist of any discrepancies within 1 day of receipt;

- Conducting internal laboratory audits to assess implementation of the laboratory Quality Assurance Manual (QAM) and procedures and providing written records of those audits;

- Rapidly notifying the Site Manager and Project Chemist regarding laboratory nonconformance with the QAPA or analytical QA/QC problems affecting RAAP samples; and

- Coordinating with the project and laboratory management to implement corrective actions as required by the MQAP, QAPA, and internal laboratory QAM.

Empirical Laboratories, LLC (Empirical) located in Nashville, TN, will be the primary laboratory performing analytical services for environmental samples collected at RAAP. Empirical will subcontract the dioxin/furan analyses to SGS Environmental Services (Wilmington, NC). Microseeps, Inc. of Pittsburgh, Pennsylvania, will perform dissolved gases analyses as required during remedial operations. Air Toxics, Inc. (Folsom, CA) will analyze soil gas samples and other air analyses that may be required for the project.

Appendix A of this QAPA includes the Empirical QAM, reporting and detection limits, and QC limits. Appendix B of this QAPA includes the Air Toxics QAM, reporting and detection limits, and QC limits. The QAMs for SGS and Microseeps are included by reference and will be maintained in the project files.

Geotechnical laboratories will be selected based on project requirements and will be identified in the site specific work plans. Selection criteria for geotechnical laboratories will be based on previous performance on ARCADIS projects or satisfactory recommendations.

4.3.2 Other Subcontractors

Other subcontractors will provide services under the direct supervision or direction of the ARCADIS PM or TMs or appropriate designated staff. The drilling, surveying, and other subcontractors are responsible for performance in accordance with the individual subcontracts and applicable portions of the QAPA as defined in each subcontract package. Subcontractors are responsible for rapidly notifying the Site Manager regarding nonconformance with the MQAP, QAPA, or QA/QC problems affecting RAAP operations. Subcontractors must coordinate with the Site Manager to implement corrective actions designated in this QAPA.

4.4 Key Points of Contact

Below are the names and points of contact for ARCADIS personnel and subcontractors.

Project Responsibility / Name / Email	Address / Telephone Number
Project Manager Tim Llewellyn Email: tim.llewellyn@arcadis-us.com	ARCADIS US 1114 Benfield Boulevard Suite A Millersville, MD 21108 Tel: 410.987.0032
Deputy Project Manager Diane Wisbeck Email: diane.wisbeck@arcadis-us.com	ARCADIS US 1114 Benfield Boulevard Suite A Millersville, MD 21108 Tel: 410.987.0032
Geology/Hydrology Joseph Quinnan, PE, PG Email: joseph.quinnan@arcadis-us.com	ARCADIS-US 10559 Citation Dr. Suite 100 Brighton, MI 48114 Tel : 810.225.1943
Health and Safety Manager Charles Webster Email: charles.webster@arcadis-us.com	ARCADIS US 6723 Towpath Rd Syracuse, NY 13214 Tel: 720.344.7200
Quality Assurance Manager Kurt Beil, PE Email: kurt.beil@arcadis-us.com	ARCADIS-US 6 Terry Dr. Suite 300 Newtown, PA 18940 Tel: 267.685.1800

Project Responsibility / Name / Email	Address / Telephone Number
Project Chemistry and Data Validation Jane Kennedy Email: jane.kennedy@arcadis-us.com	ARCADIS US 3850 N. Causeway Blvd. Suite 1600 Metairie, LA 70002 Tel: 504.832.4174
Subcontractors	
Empirical Laboratoires, LLC Marcia McGinnity Email: MMcGinnity@EmpirLabs.com	Empirical Laboratories, LLC 227 French Landing Dr. Suite 550 Nashville, TN 37228 Tel: 615.345.1115
Air Toxics, Inc. Brandon Dunmore Email: b.dunmore@airtoxics.com	Air Toxics, Inc. 180-B Blue Ravine Road Folsom, CA 95630 Tel: 916-985-1000

5. Quality Assurance Objectives

QA is defined as the overall system of activities for assuring the reliability of data produced. The site specific work plans in conjunction with the RAAP MWP and MQAP present investigative, chemical, and regulatory measures associated with the QA Objectives of the PBC2 scope. Conformance with referenced SOPs and QA protocols presented in the MQAP and this QAPA will ensure attainment of QA objectives. The overall system integrates the quality planning, assessment, and corrective actions of various groups in the organization to provide the independent QA program necessary to establish and maintain an effective system for collection and analysis of environmental samples and related activities. The program encompasses the generation of complete data with its subsequent review, validation, and documentation. Section 3 of the MQAP presents the general QA objectives and source documents for the Levels of Concern (LOCs). This section of the QAPA addresses additional QA objectives for the PBC2.

The DQO process is a strategic planning approach to ensure environmental data is of the appropriate type, quantity, and quality for decision-making. Project-specific DQOs are included in Table 2-3 for investigative activities. The overall QA objective is to develop and implement procedures for sample and data collection, shipment, evaluation, and reporting that will allow reviewers to assess whether the field and laboratory procedures meet the criteria and endpoints established in the DQOs. DQOs are qualitative and quantitative statements that outline the decision-making process and specify the data required to support corrective actions. DQOs specify the level of uncertainty that will be accepted in results derived from environmental data. Guidance for the DQOs Process (USEPA, 2004), and Guidance for DQOs for Hazardous Waste Sites (USEPA, 2000) formed the basis for the DQO process and development of RAAP data quality criteria and performance specifications.

DQOs will be established for each site specific work plan because the DQOs will vary across projects. A table summarizing the DQO process will be included in each work plan. Following is a summary of the seven steps that will be conducted to develop the DQOs.

1. **State the Problem:** Define the problem to focus the study. Specific activities conducted during this process step include

    a. the identification of the planning team and the primary decision-maker,

b. the statement of the problem, and

c. the identification of available resources, constraints, and deadlines.

2. **Identify the Decision:** Define the decision statement that the study will attempt to resolve. Activities conducted during this step of the process involve the following:

   a. identification of the principal study question(s), and

   b. definition of resultant alternative actions.

3. **Identify Inputs to the Decision:** Identify information inputs required for resolving the decision statement and assessing which inputs require environmental measures. This step of the process includes identification of the data that will be required to make the decision, identification of the information sources, identification of data required for establishment of study action levels, and confirmation of appropriate field sampling and analytical methods. The type of information that is needed to resolve the decision statement and the sources of this information may include the following:

   a. Risk-Based Concentration (RBCs) in the most recent version of the USEPA Region III screening standards, Federal Maximum Contaminant Levels (MCLs), and Commonwealth of Virginia Water Quality Criteria;

   b. Method Detection Limits (MDLs) and Reporting Limits (RLs) for the site chemicals of interest;

   c. Results of an examination of site use, operational history, environmental setting, GW and surface water use and characteristics, and soil exposure characteristics;

   d. Results of physical testing of soil for geotechnical properties; and

   e. Validated results of chemical analyses performed on site samples.

4. **Define the Boundaries:** Define decision statement spatial and temporal boundaries. This step specifies

a. the spatial boundary,

b. the target population characteristics, applicable geographic areas and associated homogeneous characteristics, and

c. the constraints on sample collection.

5. **Develop a Decision Rule:** Define the following:

   a. the parameters of interest,

   b. the action levels, and

   c. develop a decision rule.

6. **Specify Acceptable Limits on Decision Errors:** Specify the decision-maker's tolerable limits on decision errors. This step includes identification of**:**

   a. parameter range of interest,

   b. decision errors, and

7. **Optimize Data Design:** Identify data collection activities commensurate with data quality specifications. This final step in the process consists of:

   a. reviewing DQO outputs and existing environmental data,

   b. developing data collection design alternatives, and

   c. documentation of operational details and theoretical assumptions.

6. Sample Management

Sample management objectives will be met through adherence to the sample identification procedures (identification convention), documentation requirements, and COC procedures in the MWP.

6.1 Sample Locations, Numbers and Types

The site specific work plans will provide itemizations of the samples to be collected, sample depths (if applicable), and analytical parameters for environmental samples proposed during this investigation. Rationale for locations and types of samples with associated QC samples identified. Data use will also be defined in the specific work plans.

6.2 Sample Container, Preservation Method, and Holding Time Requirements

The volumes, containers, and preservatives required for the sampling activities are listed in Table 6-1. The laboratory will provide new, pre-cleaned sample containers. The laboratory shall use an approved specialty container supplier that prepares the containers in accordance with USEPA bottle preparation procedures. The laboratory must maintain a record of all sample bottle lot numbers shipped to RAAP in the event of a contamination problem. Trip blanks (TB) will be transported to the site inside the same cooler/box as the Volatile Organic Compound (VOC) vials.

Sample container lids will not be mixed. All sample lids must stay with the original containers as provided by the supplier. Bottle lids (with any associated bottle) exhibiting cracks, splits, or chips shall be appropriately discarded.

Pre-preserved containers obtained from the laboratory shall be used for all samples requiring preservation. Reagents used for preservation will be reagent-grade chemicals supplied by the laboratory. Each bottle received from the laboratory must be clearly labeled with the type of chemical preservative in the bottle and the test parameters that will be determined from sample collected in the container. Sample containers will not be stored at the site for longer than 30 days.

Bottle orders will be submitted to the laboratory 5 working days prior to commencement of field operations to allow supplies of clean, fresh containers and preservatives to be shipped to the facility.

Sample preservation will be verified on receipt at the laboratory with the exception of aqueous VOC samples. VOC sample preservation shall be verified prior to analysis. The preservation or pH check will be recorded on the sample receipt form or other appropriate logbook. If the samples are improperly preserved, a corrective action form will be submitted to the laboratory PM for follow-up action. The laboratory will notify the ARCADIS Field Operations Manager or Project Chemist to implement corrective actions in the field to ensure sufficient preservative is added at the time of sample collection.

Sample holding times will be based on published EPA guidance and will be calculated for the date and time of collection. A list of preservatives and holding times for each type of analysis are presented in Table 6-1. Additional preservation requirements and holding times for non-target analyses are listed in 40 Code of Federal Regulations (CFR) Part 136. Preservatives and holding times not listed in Table 6-1 applicable to a specific area will be provided in the site specific work plan.

6.3 Sample Identification

Each sample will be identified by a **unique** sample identification number in the logbook and on the COC record using an alphanumeric code. Field samples will be linked to geographic location via location codes. Where possible, location codes will link historical sample data with new data. Field samples will be identified using the following convention where historical identifications (IDs) are not available, contradict or duplicate the IDs previously used:

- Historical sampling locations/IDs will be utilized where possible to facilitate data linking.

- The SWMU, OU, Area, or Monitoring Well (MW) number in the format “SWMU##”, “OU##”. “A##”or “MW##” as based on the associated SWMU, operable unit, area or location of the sample collection point at the facility;

- GW, surface water, and sediment sample IDs will end with the date (in “mmddyy” format);

- Soil samples will end with the depth interval (in ft).

- Blind duplicate samples will be labeled sequentially, starting at 1, in the form OU##DUP01[location type code](mmddyy).

Following are some examples:

- GW Sample collected from MW 47 on June 1, 2008, would be: MW-47 (060108); and
- Surface Soil Sample 4 collected from 0 to 6 inches at SWMU 57 would be: SWMU57-SS004(0-0.5).
- General location type codes are listed below:
  - MW - monitor well or the current convention will be continued using MI, RI, PZ, etc.;
  - TW - temporary well;
  - SB - soil boring (by drilling);
  - GP - soil by direct push (or Geoprobe®);
  - SS - surface soil by trowel or other hand collection method;
  - EX - excavation;
  - SW - surface water by any collection method; and
  - SE - sediment by any collection method.

In addition to the above nomenclature, the COC will be completed to include the Sample Type and Sample Matrix using the codes defined below. Acceptable sample type codes are listed below:

- N - normal or primary sample;
- FD - field duplicate;
- EB - equipment blank; and
- TB - trip blank

The sample matrix will be identified using the following codes:

- IDM – investigation derived material;
- SO - soil sample;
- SE - sediment sample;

- WG - groundwater;
- WS - surface water;
- WT – wastewater; and
- SL - sludge.

These are the commonly used sampling codes. Additional coding will be developed as necessary to maintain electronic database integrity.

Field duplicate samples will be given a “blind” unique number that is different from the original sample while incorporating the standard sample pattern. This number with the corresponding field sample ID will be recorded in the field logbook, so that the duplicates can be identified at a later date.

Samples collected with an additional volume for matrix spike/matrix spike duplicates (MS/MSDs) will be designated on the COC in the remarks column.

Sample coolers will be identified with a unique number that will incorporate the cooler number and the date shipped to the laboratory. Cooler Number 1 for samples shipped on May 5, 2008, would be would be identified as 1-050508. The COC included in this cooler will carry the same number as the cooler.

Equipment blanks will be identified using the sample type code (i.e., EB) followed by the date as “MMDDYY” as a parenthetical statement. If more than one equipment blank is generated for a single day an alpha numeric character will be added to differentiate the blanks. For TBs, the sample code of “TB” will be followed by the cooler identification number. For example the TB associated with Cooler Number 3-050508 submitted on May 5, 2008 would be identified as TB3-050508.

COC records will be completed and shipped with the samples to the laboratories. Each COC will include the cooler number which will also identify the COC for sample tracking purposes. A copy of the COC will be retained with the field records. If samples are shipped by commercial carrier, the shipping records will be maintained in the project files with the field records.

SOP 50.1 in the MWP provides details on sample label completion.

6.4 Sample Handling and Custody Requirements

Field and laboratory personnel will, at all times, be aware of the need to maintain all samples, whether in the field or in the laboratory, under strict COC protocols and in a manner to retain physical properties and chemical composition. The following sections detail sample handling and sample custody requirements from collection to ultimate disposal.

6.4.1 Sample Handling

The transportation and handling of samples will be accomplished in a manner that not only protects the integrity of the sample, but also documents sample custody. Regulations for the packaging, marking, labeling, and shipping of hazardous materials are promulgated by the U.S. Department of Transportation (DOT) in 49 CFR 171 through 177. The procedures for sample packing and shipping in accordance with regulatory requirements are documented in the HSPA (Transportation of Hazardous Materials).

6.4.2 Sample Packaging

MWP SOP 50.2 provides information on sample packaging. This section includes addition requirements and details for PBC2.

Samples will be packaged carefully to avoid breakage or cross contamination and will be shipped to the laboratory at proper temperatures. The following general packaging guidelines will be followed in addition to the DOT requirements:

- Sample containers will generally be segregated according to sample matrix and expected contaminant concentration. Soil samples will not be shipped with water samples, and low-concentration samples will not be shipped with medium- and high-concentration samples;

- Sample bottles from specific sampling locations will be placed in the same cooler where possible;

- In cases where samples for volatile analysis will be shipped in several coolers on a single day, VOC vials may be consolidated into a single cooler to minimize the number of required TBs;

- Temperature blanks may be provided by the laboratory or prepared in the field prior to sealing coolers;

- Under no circumstances will packing material such as sawdust or sand be used;

- Custody seals will be affixed to the sample cooler in such a way as to indicate any tampering during shipment and then dated and initialed; and

6.4.3 Sample Custody

The primary objective of the COC procedures is to provide an accurate, traceable record of the possession and handling of a sample from collection through completion of all required analyses and final disposal. Formal sample custody procedures begin when sample collection is initiated. Sample identification documents will be carefully prepared so that sample identification, COC, and integrity are maintained and sample disposition controlled.

A sample is in custody if it is:

- In a sampling team member's physical possession;

- In a sampling team member's view;

- Locked in a vehicle;

- In a custody-sealed container during shipment via commercial courier; or

- Held in a secured area that is restricted to authorized personnel.

The laboratory must follow internal written and approved procedures for shipping, receiving, logging, and internally transferring samples.

6.4.3.1 Field Custody Procedures

Pre-cleaned sample containers will be shipped to RAAP or other location designated by the Field Operations Leader. The Field Operations Leader may record receipt of the sample containers in the project logbook. The following field custody procedures will be used for collection of samples:

- As few persons as possible should handle samples;

- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under COC protocols;

- The Field Operations Leader will determine whether proper custody procedures were followed during field operations and decide if replacement samples are required.

6.4.3.2 Chain-of-Custody Record

MWP SOP 10.4 provides COC form protocols. In addition, the COC record must be fully completed by the technical staff designated by the Field Operations Manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations), the person completing the COC record should note these constraints in the "Remarks" section of the COC record. The COC record should also indicate any special preservation techniques necessary or whether the samples need to be filtered and clearly indicate field QC samples for MS/MSD, TBs, and equipment blanks. The original signed COC record accompanies the samples from the field to the laboratory where receipt is documented by appropriate signatures and dates. Copies of the COC records are maintained with the project file.

7. Documentation

Section 5.6 of the MQAP and MWPSOPs provide the primary methodology for 10.1 through 10.4 field documentation. Additional information regarding documentation and management to be employed under PBC2 are listed below.

7.1 Corrections to Field Documentation

As with all bound data logbooks, no pages will be removed for any reason. If corrections are necessary on any field documentation, they will be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside it. The correction must be initialed and dated. Corrections will include an explanation footnote, as applicable.

7.2 Photographs

Photographs will be taken as directed by the team leader. Documentation by a photograph will ensure the validity as a visual representation of an existing situation. A log will be developed to track the media that the photos are filed on (e.g., compact disc, floppy disk). Photographs, as developed or transferred to electronic media, shall be compiled into a photograph log and information recorded in field notebooks added to the log with appropriate photographs. The following information will be noted in the log for digital or non-digital photographs as applicable to the media utilized for preservation:

- Date, time, location, and direction photograph was taken;
- Reasons why the photograph was taken; and
- Sequential number of the photograph and the film roll number or electronic media identification.

7.3 Laboratory Data Reporting/Record Retention

Analytical data reports for samples collected in conjunction with contaminant delineation, risk assessment, or remediation attainment verification at RAAP will include the following items and will be defined as a Level 4 Data Package. The elements of the Level 4 (CLP-like) Data Package include all of the Level 2 (defined below) components and instrument tuning, initial and continuing calibrations, raw data

associated with instrument performance and sample analysis. Level 4 reports will also contain a summary report or batch identification report clearly linking all QC results to actual field sample results. The case narrative will present an explanation of all QC results reported outside control limits and samples analyzed at dilutions where all results are non-detect. The laboratory report will include copies of any nonconformance or corrective action forms associated with data generation.

The majority of analytical data packages will be defined as a Level 2 Data Package and will not include raw or calibration data. Level 2 Data Packages for RAAP will include a fully-executed COC sample receipt checklist cross-reference table of field samples that identifies laboratory and sample number preparation and analytical batch numbers, analytical results, collection and analysis dates, RLs, dilution factors, surrogate recoveries, method blank data, laboratory control samples (LCSs), matrix spikes, laboratory replicates, laboratory control limits, and explanation of data flags, as well as a case narrative and fully executed COC.

Soils will be reported on a dry weight basis. The Reporting and (MDLs) will be corrected for percent moisture (soils only) and all dilution factors. Any compounds found less than the RL, but greater than the MDL should be reported and qualified with a “J” flag as estimated.

The laboratory will provide an electronic data deliverable (EDD) that matches all data reported on the hard copy analytical report. Electronic data report requirements are described in Section 9.3.

All records related to the analytical effort will be maintained at the laboratory or in the office (for field screening data) in access controlled areas for at least 1 year. All records will be maintained in a secure location for a period of 6 years after the final report is issued.

7.4 Electronic Data Retention

Electronic data and media retention policies will correlate with hard copy data retention at the laboratories as well as other points of electronic data generation. Additionally, electronic data must be subject to back-up routines that will enable recovery of data that may become corrupted or lost due to instrument, computer, and/or power failures. Electronic media will be stored in climate-controlled areas to minimize potential for degradation. Storage areas will be access limited.

8. Analytical Procedures

This section supplements Section 7.0 of the MQAP. Analytical methods will be USEPA approved unless non-standard methods are required to evaluate the presence of unanticipated or unusual compounds. Additional USEPA-approved methods that may be utilized are published in references listed below. The primary analytical methods anticipated to be utilized for samples collected during RAAP activities are listed in Table 6-1. The analytical methods are referenced in:

- Test Methods for Evaluating Solid Waste, Physical Chemical Methods, 3rd edition, SW-846, 1997 as amended;
- 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act;
- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 21st Edition, 2005; and
- Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983.

The primary parameter lists that may be reported and associated MDLs, RLs and screening standards are identified in Tables 8-1 through 8-6.

Where non-standard analytical chemistry methods are required, the Project Chemist will review performance data with the laboratory for any non-standard method prior to utilization of the procedure. The method for determination of dissolved light hydrocarbons is a non-standard method developed by Microseeps to detect very low concentrations of target compounds in groundwater. This is the only method currently anticipated that is not an EPA approved method.

Specific performance criteria, including QA protocols, for each analytical method are documented in the published methods and laboratory SOPs and the laboratory QAM. The laboratory SOPs will be examined as necessary. Note that “QAM” is a generic term for the laboratory QA document, which describes the laboratory program to ensure data of known quality are generated. The Empirical QAM is provided in Appendix A. The Air Toxics QAM is provided as Appendix B. The SGS Environmental Services (Dioxin/Furans) and Microseeps (dissolved light hydrocarbons) QAMs are included by reference to this document.

8.1 Physical/Geotechnical Analysis

Soil samples may require the determination of physical/geotechnical parameters. Analyses will be conducted for the following:

- Grain-size analysis (ASTM D 422);
- Atterberg limits (ASTM D 4318);
- Soil moisture content (ASTM D 2216);
- Total organic carbon (Walkley-Black Method);
- pH (ASTM D 4972): and
- Cation Exchange Capacity.

8.2 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Primary calibration information is presented in Section 7.0 of the MQAP. Laboratory and field instruments and equipment used for sample analysis will be serviced and maintained by qualified personnel. Procedures will be implemented to ensure that instruments are operating properly and that calibrations are correct prior to analysis and reporting of any sample parameters.

8.2.1 Field Equipment Maintenance Field Equipment Maintenance

ARCADIS primarily rents equipment as necessary to complete field operations and acquire the necessary data. All equipment will be inspected upon receipt to ensure that it is in working order. Field personnel will be familiar with the appropriate calibration and use of all rental equipment. Supplier, type of instrument, and instrument identification numbers will be recorded in the field documentation. Calibration of all rental equipment will be verified.

Additional information for Field instrumentation is included in Section 7.4 of the MQAP.

8.2.2 Laboratory Equipment Maintenance

The laboratory must maintain an adequate stock of spare parts and consumables for all analytical equipment. Routine preventive maintenance procedures should be documented in the laboratory SOPs and/or QAM. Maintenance performed on each piece of equipment must be documented in a maintenance logbook. Daily checks of the laboratory deionized water and other support systems will be performed. The laboratory will have backup instrumentation or a process in place for most of the analytical equipment to minimize potential adverse impacts on data quality due to instrument malfunction. For example, the laboratory should have duplicate instrumentation and/or maintain service agreements for rapid response with the manufacturer major laboratory instruments (e.g., GC/MS, ICP).

8.3 Instrument Calibration and Frequency

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations, as well as criteria set forth in the applicable analytical methodologies and SOPs. The laboratory QAM (Appendix A) provides brief descriptions of instrument calibration procedures to be performed by the analytical laboratories. Personnel properly trained in these procedures will perform operation, calibration, and maintenance of all instruments. Documentation of all routine and special maintenance and calibration information will be maintained in an appropriate logbook or reference file and will be available for inspection. All laboratory instrument calibration is set forth in analytical method SOPs.

Field instrument calibration will be performed in accordance with the applicable SOP. Table 8-7 lists typical monitoring equipment used during fieldwork. This equipment is representative of instruments typically required for RAAP GW and field sampling operations. All field personnel receive annual refresher training on the field operation of all health and safety related equipment, which includes calibration procedures. Brief descriptions of calibration procedures for major field instruments are provided in Table 8-7. All equipment calibration performed in the field must be recorded on the field instrument calibration forms and the documentation will be retained in the project file.

8.4 Inspection/Acceptance Requirements for Supplies and Consumables

Acquisition and/or purchase of material, equipment, and services will be prepared, reviewed, and approved in accordance with the requirements laboratory SOPs or as set forth in the ARCADIS subcontracting procedures, as applicable.

8.4.1 Standard Reagent Receipt and Traceability

For analytical laboratory operations, all standards are obtained directly from USEPA or through a reliable commercial supplier with a proven record for quality, traceable standards. All commercially supplied standards must be traceable to USEPA or National Institute of Standards and Technology (NIST) reference standards, and appropriate documentation will be obtained from the supplier. The certificates will be kept on file in a central location. When standards are received, they will be documented with the following: date received, chemical, lot number, concentration, and date opened or expiration date. When standards are prepared from these source materials, information will be included in a logbook with date of preparation, lot source, amount used, final volumes, resulting concentration, and preparer's initials. Laboratory SOPs and standards/reagent records will be reviewed during laboratory audits or if QC problems arise to ensure traceability requirements are met.

For field operations, standards are primarily applicable to chemical preservatives as described in Section 6.2 and field instrument calibration solutions for pH, conductivity, and turbidity. Chemical preservatives are typically obtained from the laboratory that is responsible for maintaining the traceability records. Field instrument calibration standards are obtained from chemical suppliers and records maintained by ARCADIS.

8.4.2 Field Sampling Equipment Procedures

Field supplies and equipment will be obtained from a reputable and reliable distribution company. The Field Operations Leader will inspect all supplies and equipment upon receipt at the site to verify that the correct materials were received. ARCADIS has established a program for maintaining field equipment to ensure that the equipment is available in good working order when and where it is needed. This program consists of the following elements:

- A list of reputable and reliable equipment rental suppliers to provide additional or specialized instrumentation as necessary to meet project requirements;

- An equipment manual is obtained from the rental supplier and kept on site during field activities as a guide to calibration and maintenance;

- Field personnel are trained in the proper use and care of equipment on an as-needed basis;

- MWP and/ or ARCADIS SOPs for field instrument used will be utilized. New SOPs shall be prepared, as necessary, to encompass appropriate field activities;

- Applicable SOPs will be available to field personnel for all work performed;

- The Field Operations Leader is responsible to make sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions before being taken to the job site; and

- A calibration/maintenance log accompanies each piece of equipment and is used to identify drift in the calibration over time, which might indicate the need for replacement of sensors or factory calibration.

8.5 Field Quality Control Elements

QC components that will be used by ARCADIS during operations at RAAP are presented below and in Section 8.0 of the MQAP. The quality components include the field QC samples and the laboratory QC elements. Rinse blanks (R), TBs, and field duplicates will be collected during the acquisition of environmental samples at RAAP. Table 8-8 presents guidelines for the collection of QC samples that will be taken in conjunction with environmental sampling. Field QC acceptance criteria are summarized in Table 8-9.

Miscellaneous QC samples may also include the analysis of source water, filters, and monitor well drilling fluids (if used). Because the water supply source is used in decontamination and well drilling activities, it may be necessary to determine the possibility for the introduction of outside contaminants. Filters may be used to evaluate dissolved constituents in GW. Filter blanks will be prepared to evaluate the potential contribution of constituents of interest to the samples. Filter blanks will be collected, preserved, and analyzed in the same manner as the field samples that they represent. Drilling fluids that are used during well installation may also be analyzed in order to assess the possibility of mud constituents affecting GW samples. Miscellaneous field QC samples will be defined and discussed in the OU-Specific Work Plan.

8.6 Laboratory Quality Control Elements

The laboratory QC elements are summarized in Table 8-10. Specific laboratory analytical QC criteria and corrective actions are summarized in Tables 8-11 through 8-17.

Analytical performance is monitored through various QC samples and spikes, such as laboratory method blanks, surrogate spikes, laboratory control sample (LCS), MS/MSDs and replicate samples. All QC samples are performed on the basis of a laboratory batch. Two basic types of batches are used: the preparation batch and the analytical batch. The preparation batch includes all samples processed as a unit during organic sample preparation, metals digestion, or wet chemistry preparation. Preparation batches will not exceed 20 samples excluding associated QC samples. The analytical batch consists of all samples analyzed together in the actual analytical sequence and is also limited to a maximum of 10 or 20 samples based on the method. The QC samples associated with sample preparation include method blanks, laboratory control samples (and duplicates), and matrix spikes (and duplicates). Surrogates are introduced into samples during preparation for extractable organic constituents or prior to purging for VOCs. For some analyses, such as volatile organics, the analytical batch is equivalent to the preparation batch. The analytical sequence includes calibration standards, instrument blanks, and reference standards.

Instances may arise where elevated concentrations of target analytes/compounds, non-homogeneous samples, or matrix interferences preclude achieving the detection limits or associated QC target criteria in a specific sample. In such instances, data will be examined on a case-by-case basis during the data validation process to determine the usability of the reported values. The laboratory will report the reason for deviations from these detection limits or noncompliance with QC criteria in the case narrative. The laboratory QC samples listed below will be prepared and analyzed at the frequency presented in Table 8-18.

The laboratory-specific QC criteria are provided in appendix A (Empirical) and B (Air Topics) SGS.

Following is a discussion of each type of QC sample utilized in the analytical laboratories.

8.6.1 Laboratory Method Blank

A laboratory method blank is an analyte-free material of similar matrix processed in the same manner, in the same analytical batch, and at the same time as a project sample. The blank is prepared using American Society of Testing Materials (ASTM) Type II water when analyzing water samples and, where practical, pre-cleaned sand or other solid material, such as sodium sulfate, when analyzing solid samples. The laboratory method blank sample is prepared in the same batch with the project samples at a frequency of 1 laboratory method blank per batch of 20 (or fewer) project samples for the given matrix type. The laboratory method blanks serve to demonstrate a contamination-free environment in the laboratory, reagents, and glassware utilized in sample preparation and analysis. The goal is for method blanks to be free of contamination or at a maximum less than the RL. Low-level contamination may be present, but must be less than RLs for undiluted samples. If contaminants are present in the method blank but not in project samples, no further action is required. Where blank contamination exceeds general method guidance criteria, the laboratory shall re-prepare and re-analyze the samples or shall contact the ARCADIS Project Chemist for determination of appropriate corrective action. Qualification of constituents detected in method blanks and in associated field samples will be based on the criteria set forth in the validation section of this QAPP. All sources of contamination that are not common laboratory contaminants as defined in the method SOPs must be investigated as part of the corrective action process.

8.6.2 Surrogate Standards

For certain organic methods, all samples, including the method blanks and QC samples, are spiked with a set of specific surrogate standards to monitor the accuracy of the analytical determination. Surrogate spikes are added at the start of the laboratory preparation process. Surrogate compounds are not typically found in environmental samples. QC criteria for surrogate recoveries are method- and matrix-specific. Surrogate recoveries must be within QC limits for method blanks and LCS samples to demonstrate acceptable method performance. If surrogate recoveries are outside QC criteria for method blanks or LCS samples, corrective action is required and the Project Chemist should be notified. The percent recovery of surrogates in a specific sample provides an indication of the total accuracy of the analytical method in that specific sample only. Surrogate recoveries that are outside QC criteria for a sample indicate a potential matrix effect. Matrix effects must be verified based on review of recoveries in the method blank or LCS, sample reanalysis, or evaluation of interfering compounds. Sample clean-up procedures required by the laboratory SOPs

must be implemented to alleviate potential matrix problems. Surrogate recoveries are calculated using the following formula.

$$\%R = \frac{SR}{SA} \times 100$$

Where:

%R = % Recovery

SR = Sample Result

SA = Surrogate Concentration Added

8.6.3 Laboratory Control Samples and Laboratory Control Sample Duplicates

An LCS or LCS Duplicate (LCSD) consists of ASTM Type II water and, where practical, pre-cleaned sand or sodium sulfate for solid matrices, or a purchased performance testing sample. Type II water is defined (D1193-91- Standard Specification for Reagent Water) by ASTM as “water that has greater than 1 megaohm-cm resistivity”. The referenced ASTM method covers requirements for water suitable for use in methods of chemical analysis and physical testing. The source of the chemicals utilized for LCS spiking will be from a different supply source than the calibration standards. Where second source standards are not available, the LCS must be spiked with materials from a separate manufacturing lot of the standard. The analytical laboratory will maintain complete records of standards tracking and preparation which will be available for review as necessary. Any deviation from utilization of second source standards will be approved by the Project Chemist.

The LCS is generally spiked with all of the analytes of interest near the mid-point of the calibration range as defined by the method. In some instances, spiking with a subset of the target compounds will be acceptable for the LCS where permissible in the SW-846 method protocol and with approval of the Project Chemist. The LCS is processed under the same sample preparation, surrogate and internal standards addition, and analytical protocols as the project samples. LCSs are analyzed at the frequency of 1 per batch of 20 samples or fewer of similar matrixes. The recovery of target analytes in the LCS provides an evaluation of method performance and accuracy. Method control may be established based on the subset of compounds listed in the method. LCSDs are analyzed with some methods but are not required QA components. LCSDs are

prepared and analyzed by the same protocols as the LCS. LCSD analyses provide precision evaluation of the method performance in addition to the accuracy information.

Laboratory QC criteria for LCSs and LCSDs are established for each method and matrix. Appendices G and H list the control limits for the laboratories performing analyses for MLAAP. The laboratory will update the QC limits annually. The LCS recovery of the method-specific control compounds/analytes must be within the laboratory-established control limits to demonstrate acceptable method performance. If the LCS recoveries are outside QC criteria for more than a few target analytes, recoveries are significantly low (<10 percent) and corrective action is required. After corrective action is complete, sample re-analysis is required for the failed parameters. If LCS recoveries exceed the QC criteria, and that parameter is not detected in any of the samples, re-analysis is not necessary. For any other deviations from the LCS control limits that cannot be resolved by sample re-analysis within holding times, the Project Chemist must be notified immediately. If critical samples are affected, the ARCADIS Task Manager may determine that resampling is required.

8.6.4 Matrix Spike and Matrix Spike Duplicate Samples

The MS and MSD samples consist of a project sample processed as three separate samples. Additional sample volume will be collected in the field, identified on the COC, and provided to the laboratory for use as the MS and MSD samples. In addition to the regular addition of monitoring standards (internal standards, surrogate), spiking analytes are added to the second sample aliquot. Generally, all method target analytes, if compatible, are added. A subset of target analytes may be used if indicated in the method SOP. An MS and MSD will be prepared for every batch of 20 samples (or fewer) for a given matrix unless sufficient sample volume is not available. Where site specific MSs cannot be performed, the laboratory shall include a batch MS/MSD or blank spike for additional evaluation of method performance in accordance with SW-846 method protocols and the laboratory SOP. Percent recoveries for batch specific MS/MSDs will be utilized only to evaluate method performance. Site samples will not be qualified based solely on the spike recoveries in matrices from other locations where the batch LCS is in control. Equipment and TBs must not be utilized for matrix spike evaluation. MS/MSD recoveries are a measure of the performance of the method on the matrices of samples being analyzed. MS recoveries outside the control limits for batches where the LCS is demonstrated to be in control indicate potential matrix effects. Sample clean-up procedures may be warranted for samples with severe matrix effects. The laboratory shall notify the Project Chemist of instances of extreme matrix effects on the analytical data to determine appropriate corrective action.

The percent recovery (%R) formula is as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

Where:

SSR = Spike Sample Result

SR = Sample Result

SA = Spike Added

MS and MSD recovery control limits will be based on laboratory established control limits for the methods performed. The Project Chemist will review the laboratory control limits prior to approval for use for project samples.

The RPD between the MS and MSD recoveries is calculated by the laboratory utilizing the following formula.

$$RPD = \left(\frac{PR - DR}{\frac{1}{2}(PR + DR)} \right) \times 100$$

Where:

PR = Primary Sample Result

DR = Duplicate Sample Result

The laboratory-derived advisory control limit for RPD will be utilized for evaluation of precision for MS pairs. Laboratory control limits are provided in Appendices G and H.

8.6.5 Laboratory Replicate Sample

A laboratory replicate consists of a second aliquot selected by the laboratory from the same project sample. These types of QC samples are primarily used in inorganic analyses including general chemistry techniques. Selection of replicate samples from a heterogeneous matrix requires homogenization to ensure that representative portions are analyzed. One sample per batch of 20 samples or fewer per matrix is analyzed in lieu of an MSD. The duplicate is prepared for methods that typically show concentrations of target analytes above MDLs, such as wet chemistry methods. The RPDs between the recoveries in the original and duplicate spikes measure the precision of the analytical method on the actual project samples. These limits will be utilized to evaluate laboratory precision for replicate samples prepared in the laboratory for methods where MSDs are not appropriate. If all other QC criteria are met, RPD results outside control limits indicate potential matrix effects and non-homogeneity of the sample. The laboratory shall investigate significant deviations in the RPD results by observing the sample to determine any visual heterogeneity or reviewing sample data for matrix interference. If visual observation does not indicate a potential problem, the sample may be re-analyzed. Potential matrix effects are reported and discussed in the case narrative. The RPD is calculated using the same formula as the RPD for the MS/MSD.

8.6.6 Calibration Verification Standards

A standard is obtained from a different source or, at a minimum, a different lot from that of the calibration standard. A check standard result is used to verify an existing calibration or calibration curve. The check standard provides information on the accuracy of the instrumental analytical method independent of various sample matrices. Calibration verification standards are analyzed with each analytical batch as applicable to the analytical method and SOP.

8.6.7 Method-Specific QC Samples

The laboratory will follow all specific quality processes as defined by the analytical method and laboratory SOP. Method-specific QC samples may include analysis of other QC samples or standards identified in the specific method SOP. Method-specific QC samples or standards include internal standards for gas chromatography (GC) and/or GC/mass spectroscopy (GC/MS) methods, post-digestion spikes and serial dilutions for metals analysis, and interference check samples for ICP analysis.

8.6.8 Performance Checks

The laboratory will perform analyses of performance test samples as required to maintain NELAP and other applicable accreditations. The Project Chemist will review laboratory performance test sample results on a semiannual basis. In the event that the laboratory fails any performance test parameters that impact the project samples, the laboratory will immediately notify the Project Chemist to identify appropriate corrective action implementation and to determine if any project data have been impacted.

9. Data Reduction, Validation, Reporting, and Management

In general, EPA-approved Methods will be performed for analytical work associated with PBC2. The method for quantitation of dissolved light hydrocarbons will be performed by Microseeps Laboratories, Inc., Pittsburg, PA. This method is a non-standard method to achieve very low detection limits for the compounds of interest during the monitoring of in-situ remediation systems. All other methods are EPA approved.

All laboratories performing analytical methods will be accredited under the NELAP. Additional details for the laboratory deliverables may be found in Section 9.8.3 of the MQAP and Section 4.2.4 of this document. Analytical data reports will be included in the primary investigation or study report in which the data are presented.

9.1 Detection and Reporting Limits

The laboratory MDLs and quantitative RLs are provided in Tables 8-11 through 8-17.

9.2 Rounding Rules

This section supplements Section 9.2 of the MQAP. Rounding to significant figures will be in accordance with current EPA method guidelines. The reported values must match the electronic data and utilize the same rounding routines.

9.3 Electronic Data Management

Electronic data management provides the ability to track samples and results from work plan implementation to the final report. The surveyor will provide coordinates for all sample locations in electronic format. The Field Operations Leader will review all field data for accuracy. Field data, as appropriate or applicable, will be manually entered into spreadsheet for incorporation into the project database. Risk evaluation screening standards will also be uploaded to the database.

ARCADIS will use the Environmental Quality Information Systems (EQuIS) data management system to handle environmental data for the RAAP project. EQuIS is a comprehensive geo-environmental data management database designed to store analytical test data and related data. EQuIS can be used for report and chart generation and is integrated with multiple statistical, numerical modeling, and data visualization tools.

The laboratory will provide an EDD for all analytical reports in accordance with requirements for upload to the EQuIS database system. Summary QC data will be included in the EDD to allow electronic screening of certain QC parameters.

The Project Chemist or designee will review approximately 5 percent of electronic laboratory and field data to verify the results against the hard copy and check for transcription errors. A greater than 15 percent discrepancy rate in two consecutive datasets will require additional review and verification.

Historical site data will be imported into the project database as necessary to support the PBC2. Data qualifiers and annotations previously applied will be incorporated. It is assumed that historical qualification has been applied consistent with CERCLA requirements. Qualification protocols for data generated under this QAPA and associated documents are described in Section 9.6 and are consistent with CERCLA guidance.

9.4 Data Validation

This section provides supplemental information associated with Section 9.5 of the MQAP. Data validation and usability criteria set forth in the MQAP as appended by this QAPA shall be followed unless otherwise amended in the area specific Work Plan.

9.4.1 Data Review, Validation, and Verification Requirements

Manual combined with electronic data validation will be conducted by a data validator not directly associated with the field-sampling program. The Project Chemist will oversee the performance of data validation functions. Data validation will be performed by knowledgeable and experienced individuals who can best perform evaluations within the necessary validation components. Validation staff qualifications will include experience with each of the elements required for the data verification and validation including ensuring that the measuring system meets the user's needs, assigning qualifiers to individual data values, assessing the relevancy of performance criteria, and concluding that data can proceed to quality assessment and reporting.

9.4.2 Validation and Verification Methods

Data validation will be conducted as set forth in this Section and Section 9.5.2 of the MQAP. Validation criteria will be based on these QA documents plus the analytical method performance criteria, laboratory QAM, laboratory control limits, USEPA Region

III guidance, USEPA Region III Modifications and professional judgment. The USEPA National Functional Guidelines (NFGs) for Organic and Inorganic data review will primarily be utilized as guidance for method qualification because the USEPA Contract Laboratory Program (CLP) methods will not be performed.

For samples collected in support of contaminant delineation, risk assessment, and confirmation of remedial goal attainment, 100 percent of the data will undergo Region III Manual Levels M-2/IM-1 data verification and validation. Approximately 10 percent of samples, collected for the above purpose, will additionally be validated in accordance with Region III M-3/IM-2. Selection of data packages for in-depth review will be random across the time period of sample collection. Levels M-3 and IM-2 will be performed on an SDG or complete laboratory report basis. Individual samples will not be singled out for particular levels of validation.

Samples collected in support of long-term operations and maintenance of selected remedies, pilot or bench scale studies, wastewater discharge compliance, or waste characterization for disposal will not be validated. If anomalous results are observed, a Level M-1/IM-1 review will be performed. Additional verification validation will be performed as necessary if this level of review indicates potential deficiencies with laboratory performance.

Data validation will be summarized in a checklist style report documenting the items reviewed with text explanations and notations of deficiencies and a summary of the qualifications applied to the analytical data. For data that will undergo the M-2/M-3/IM-2 validations, field documents will be reviewed within the perspective of impact to data quality. Any issues noted in field documentation or records that could impact data usability or quality will be noted in the validation reports.

9.5 Reconciliation with Data Usability Requirements

For routine assessments of data quality, ARCADIS will implement the data validation procedures described in Section 9.0 of the MQAP as appended by this QAPA. The data validators will assign appropriate data qualifiers to indicate limitations on the data. The Project Chemistry team will be responsible for evaluating compliance with project requirements. Deviations from the analytical performance criteria will be documented in the data validation reports.

The Project Chemist will work with the final users of the data in performing overall data quality assessments. The data quality assessment may include some or all the following steps:

- Data that are determined to be incomplete or not usable for the project will be discussed with the project team. If critical data points are involved which impact the ability to complete the project objectives, the data users will report immediately to the TM. The TM will discuss the resolution of the issue with the ARCADIS PM and implement the necessary corrective actions (for example, resampling);

- Data that are non-detect but have RLs elevated due to blank contamination or matrix interference will be compared to screening values (see Appendices B and C). If RLs exceed the screening values, then the results will be handled as appropriate for data use; and

- Data qualified as estimated (biased high, biased low) will be utilized if it is determined that the data are useable for their intended purpose. If an estimated result is close to a screening value, then there is uncertainty in any conclusions as to whether the result exceeds the screening value. The data user must evaluate the potential uncertainty in developing recommendations for the site. If estimated results become critical data points in making final decisions on the site, the PM and TM should evaluate the use of the results and may consider the data point incomplete.

Data validation codes relate to identification (confidence concerning the presence or absence of compounds) and quantitation of target parameters. The standard data validation codes that will be utilized are defined below:

Code	Definition
R	Data point is unusable due to serious deficiencies in analytical and QC criteria. The presence or absence of the analyte/compound can not be verified
UB	Not detected substantially above the level reported in laboratory or field blanks. For organics - 5X (10X for common lab contaminants) or for metals - 10X. Data point considered non-detect at the value qualified.

Code	Definition
U	Analyte/Compound not detected. The associated value indicates the concentration above which the result would be considered a quantitative value.
J	Reported value is considered an approximate concentration.
K	Estimated value, biased high.
L	Estimated value, biased low.
UJ, UK, UL	Analyte/compound not detected above the quantitation limit. However, the reported quantitation limit is approximate (biased high, biased low).

The ultimate data assessment process involves comparing analytical results to screening values and background concentrations to determine whether the contamination present is site related (i.e., above background levels) or significant (i.e., above screening values). Additional data assessment may be performed on site-by-site basis. Any additional procedures for data quality assessment will be provided in the area specific work plan.

10. Assessment/Oversight

Assessment and oversight procedures for the RAAP activities will be implemented in accordance with the MQAP, this QAPA, the PMP and other applicable documents. The QAPA in conjunction with the MQAP outlines general roles and responsibilities for the project team. Additional procedures will be developed as necessary to meet the DQOs of a specific RAAP Area of Concern or SWMU and will be presented in an addendum to the QAPA or included in the site specific Work Plan. The following section supplements Section 11.0 of the MQAP.

10.1 Assessments and Response Actions

Assessment activities include management and assessments, technical systems audits, and performance evaluations. Management assessments include routinely scheduled meetings and conference calls to evaluate staff utilization. Assignment of qualified personnel to RAAP projects, maintenance of schedules and budgets, and quality of project deliverables are verified as part of these assessments. Performance evaluations are used to ensure that trained and qualified staff is utilized for the project. Technical assessment activities applicable to RAAP projects include peer review, data quality reviews, and technical system audits (i.e., laboratory and field). Technical systems audits include review and evaluation of field and laboratory performance to assess the implementation of quality programs and directives. Procedures for peer review and technical assessments are summarized briefly below. Both the overall and direct technical assessment activities may result in the need for corrective action. The procedure for implementing a corrective action response program for both field and laboratory situations are summarized briefly below.

10.1.1 Field Inspections

The Field Operations Manager will be responsible for inspecting all field activities to verify compliance of the activities with the project plans, Health and Safety programs, and project QA documents.

10.1.2 Laboratory Audits

The laboratories must implement a comprehensive program of internal audits to verify the compliance of their analytical and management systems with the SOPs and QA Manuals. The laboratory may be requested to perform a project-specific audit to verify compliance with RAAP project requirements. The laboratory must be accredited under

NELAP and maintain current accreditation for RAAP methods and parameters where accreditation is available through the primary accrediting authority. No laboratory audits are planned by ARCADIS.

No outside laboratory audits are anticipated. The laboratory NELAP audit reports will be reviewed by the Project Chemist, as appropriate.

10.2 Corrective Action

Corrective actions will be implemented as necessary to insure data and project quality. In conjunction with the QA Manager and Project Chemist, the TM is responsible for initiating and implementing corrective action in the field. The PM and/or TMs are responsible for implementing, as necessary, corrective action in office settings. The laboratory PM, in conjunction with the laboratory technical staff and QA manager, is responsible for implementing corrective action in the laboratory. It is their combined responsibility to ensure that all analytical procedures are followed as specified and that the data generated meet the prescribed acceptance criteria. Any specific corrective actions necessary will be clearly documented in the logbooks or analytical reports.

10.2.1 Field Corrective Action Scenarios

The need for corrective action in the field may be determined by technical assessments or by more direct means such as equipment malfunction. Once a problem has been identified, it may be addressed immediately or an audit report may serve as notification to project management staff that corrective action is necessary. Immediate corrective actions taken in the field will be documented in the project logbook. Corrective actions may include, but are not limited to:

- Correcting equipment decontamination or sample handling procedures if field blanks indicate contamination;
- Recalibrating field instruments and checking battery charge;
- Training field personnel in correct sample handling or collection procedures; and
- Accepting data with an acknowledged level of uncertainty.

After a corrective action has been implemented, its effectiveness will be verified. If the action does not resolve the problem, appropriate personnel will be assigned to investigate and effectively remedy the problem.

Implementation of a Field Readiness Assessment (FRA) prior to start of fieldwork, as specified by SWP HSP-1.11, "Field Readiness Assessment Process," is required. The FRA will be constructed to determine readiness of the field activities to be performed. A FRA will be conducted:

- Prior to initial start of major phases of fieldwork;
- Prior to initiation of any significant change to the scope of work;
- As required in the Task Hazard Analysis (Exhibit 1 of the HSPA); or
- Anytime deemed necessary by the Health and Safety Manager, QA/QC Manager, or the PM.

Work considered routine (collection of water levels, routine system maintenance established in the existing work plans, etc.) may be addressed in a single FRA conducted at the start of fieldwork. Each event does not require an FRA to be conducted. Work considered "skill of the craft" (utilization of a plumber to hook water lines, etc.) is generally exempt from the FRA except the ARCADIS Site Manager or Field Operations Leader will ensure the work activity will not create a safety concern or create an unplanned interruption of site activities. This may be conducted through implementation of an FRA.

An example FRA template is presented in the HSPA.

10.2.2 Laboratory Corrective Action Scenarios

Out-of-control QC data, laboratory audits, or outside data review may determine the need for corrective action in the laboratory. Corrective actions may include, but are not limited to:

- Reanalyzing samples, if holding times permit;
- Correcting laboratory procedures;

- Recalibrating instruments using freshly prepared standards;
- Replacing solvents or other reagents that give unacceptable blank values;
- Training additional laboratory personnel in correct sample preparation and analysis procedures; and
- Accepting data with an acknowledged level of uncertainty.

Specific laboratory corrective actions for analytical deficiencies must be consistent with the analytical method. The laboratory corrective actions must be defined in analytical SOPs. Any deviations from the analytical SOP require corrective actions and documentation with approval of the ARCADIS Project Chemist. Whenever the ARCADIS Project Chemist deems corrective action necessary, the laboratory PM will ensure that the following steps are taken:

- The cause of the problem is investigated and identified;
- Appropriate corrective action is determined;
- Corrective action is implemented and the effectiveness verified by the laboratory QA Officer; and
- Documentation of the corrective action verification is provided to the Project Chemist in a timely manner.

11. References

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Tables

Table 2-1
Quality Assurance Measures Discussed in the MQAP
Radford Army Ammunition Plant, Radford, Virginia

Quality Assurance Measure	Section in MQAP	SOP No. (MWP Appendix A)
Project Organization and Responsibilities	2.0	--
Lines of Authority	2.2	--
Chemical Data Measurements	3.2	--
Levels of Concern	3.3	--
Site Investigation	4.0/5.0	20.1, 20.2, 20.3, 20.5, 20.9, 20.11, 20.12, 30.1, 30.2, 30.7, 30.8, 30.9, 40.1, 40.2, 40.3, 50.1, 50.2 70.1, 80.1
Remediation System Monitoring	NA	--
Documentation Requirements	5.6	10.1, 10.2, 10.3, 50.1
Chain-of-custody Requirements	5.7	10.4, 50.2
Calibration Procedures	7.0	90.1
Data Reduction, Validation, Reporting, and Management	9.0	--
Corrective Action	10.0	--
Quality Assessments	11.0	--

NA – Not Addressed

Table 6-1
Summary of Methods, Containers, Preservatives, and Holding Times
Radford Army Ammunition Plant
Radford, Virginia

Parameter	Matrix	Preparation Method	Analytical Method	Container	Preservative	Holding Time (a)
Primary Parameters						
TCL VOCs	Water	5030, 5032	8260	3 x 40-mL vial with Teflon-lined septum	Cool 4°C, pH<2 HCl	14 days
	Solid	5035	8260	3 x Encore™ ®	Cool 4°C	48 hours to preservation; 14 days to analysis
TCL SVOCs	Water	3510, 3520 (b)	8270	1 x 1-L amber G	Cool 4°C	7 days to extraction and 40 to analysis
	Solid	3540, 3550 (b)	8270	1 x 8-oz amber G	Cool 4°C	14 days to extract and 40 to analysis
PAHs	Water	3510, 3520 (b)	8270 (Low Level)	1 x 1-L amber G	Cool 4°C	7 days to extract and 40 to analysis
	Solid	3540, 3550 (b)	8270 (Low Level)	1 x 8-oz amber G	Cool 4°C	14 days to extract and 40 to analysis
TCL PCBs	Water	3510, 3520 (b)	8082	1 x 1-L amber G	Cool 4°C	7 days to extract and 40 to analysis
	Solid	3540, 3550 (b)	8082	1 x 8-oz amber G	Cool 4°C	14 days to extract and 40 to analysis
TCL Organochlorine Pestides	Water	3510, 3520 (b)	8081	1 x 1-L amber G	Cool 4°C	7 days to extract and 40 to analysis
	Solid	3540, 3550 (b)	8081	1 x 8-oz amber G	Cool 4°C	14 days to extract and 40 to analysis
Organochlorine Herbicides	Water	NA	8151	1 x 1-L amber G	Cool 4°C	7 days to extract and 40 to analysis
	Solid	NA	8151	1 x 8-oz amber G	Cool 4°C	14 days to extract and 40 to analysis
Explosives	Water	NA	8330, 8332, 8095	1 x 1-L amber G	Cool 4°C	7 days to extract and 40 to analysis

Table 6-1
Summary of Methods, Containers, Preservatives, and Holding Times
Radford Army Ammunition Plant
Radford, Virginia

Parameter	Matrix	Preparation Method	Analytical Method	Container	Preservative	Holding Time (a)
	Solid	NA	8330, 8332, 8095	1 x 8-oz amber G	Cool 4°C	14 days to extract and 40 to analysis
Metals (except Mercury)	Water	3005, 3010	6010 / 6020	1 x 1-L PE	pH <2 with HNO_3, Cool 4°C	6 months
	Solid	3050, 3051	6010	1 x 8-oz amber G	Cool 4°C	6 months
Mercury	Water	NA	7470	1 x 1-L PE	pH <2 with HNO_3, Cool 4°C	28 days
	Solid	NA	7471	1 x 8-oz amber G	Cool 4°C	28 days
Cyanide (Total)	Water	NA	9010 / 9012 / 9014	1 x 1-L PE	pH >12 with NaOH, Cool °4C	14 days
	Solid	NA	9010 / 9012 / 9014	1 x 8-oz amber G	Cool 4°C	14 days
Perchlorate	Water	NA	314.1	1 x 120-ml PE	Cool 4°C	28 days
	Solid	NA	314.1	1 x 4-oz PE	Cool 4°C	28 days
Dioxins/Furans	Water	NA	8290	2 x 1-L amber G + 2 x 40-ml vials	Cool 4°C	30 days to extract and 45 to analysis
	Solid	NA	8290	1 x 8-oz amber G	Cool 4°C	30 days to extract and 45 to analysis
Waste Characterization Parameters						
TCLP Metals	Solid	1311 3005, 3010	6010, 6020 & 7470	1 x 1-L wide mouth G	Cool 4°C	14 days from collection to Leach
TCLP VOCs	Solid	1311 5030, 5032	8260	1 x 4-oz G packed full	Cool 4°C	14 days from collection to Leach
TCLP SVOCs	Solid	1311 3510, 3520	8270	1 x 1-L wide mouth G	Cool 4°C	14 days from collection to Leach
TCLP Pest/PCBs	Solid	1311 3510, 3520	8081/8082	1 x 1-L wide mouth G	Cool 4°C	14 days from collection to Leach
Ignitability	Solid	Na	1010	250 ml wide mouth G	Cool 4°C	NA
Reactivity	Solid	Na	9010 / 9012/ 9014	250 ml wide mouth G	Cool 4°C	Sulfide 7 days

Table 6-1
Summary of Methods, Containers, Preservatives, and Holding Times
Radford Army Ammunition Plant
Radford, Virginia

Parameter	Matrix	Preparation Method	Analytical Method	Container	Preservative	Holding Time (a)
			and 9034			Cyanide 14 days
Corrosivity (pH)	Solid	NA	9045	250 ml wide mouth G	Cool 4°C	Analyze ASAP
General Chemistry Parameters						
MNA Gases	Water	NA	AM20GAX	4 x 40-mL vial with butyl rubber-lined septum	Cool 4°C	14 days (c)
Total & Dissolved Iron & Manganese	Water	3005, 3010	6010 / 6020	1 x 1-L PE	pH <2 with HNO_3	6 months
Alkalinity	Water	NA	SM 2320 B	120 ml PE	Cool 4°C	14 days
Ammonia	Water	NA	350.1 /4500-NH_3	120 ml PE	pH <2 with H_2SO_4; Cool 4°C	28 days
Chemical Oxygen Demand (COD)	Water	NA	410.3 / SM 5220 C / Hach 8000	120 ml PE	pH <2 with H_2SO_4; Cool 4°C	28 days
Chloride	Water	NA	SM 4500-Cl / 300	120 ml PE	Cool 4°C	28 days
Ferrous Iron	Water	NA	SM3500-FE-D	250 ml PE	None	Analyze ASAP
Hardness		NA	130.1	250 ml PE	pH <2 with HNO_3; Cool 4°C	6 months
Nitrate	Water	NA	353.2 / 300	120 ml PE	Cool 4°C	2 days
Nitrite	Water	NA	353.2 / 300	120 ml PE	Cool 4°C	2 days
Nitrate/Nitrite	Water	NA	353.2 / 300	120 ml PE	pH <2 with H_2SO_4	28 days
Phosphate	Water	NA	300	120 ml PE	pH <2 with H_2SO_4	28 days
Sulfate	Water	NA	9038 / 9056 / 300	120 ml PE	Cool 4°C	28 days
Sulfide	Water	NA	9034	500 ml PE	2 ml ZnAc; Cool 4°C	7 days
Total Dissolved Solids (TDS)	Water	NA	SM 2540 C	500 ml PE	Cool 4°C	7 days
Total Suspended Solids (TSS)	Water	NA	SM 2540 D	500 ml PE	Cool 4°C	7 days

Table 6-1
Summary of Methods, Containers, Preservatives, and Holding Times
Radford Army Ammunition Plant
Radford, Virginia

Parameter	Matrix	Preparation Method	Analytical Method	Container	Preservative	Holding Time (a)
Total Organic Carbon (TOC)	Water	NA	SM 5310 C	125 ml amber G	pH <2 with HCl or H_2SO_4, Cool 4°C	28 days
Dissolved Organic Carbon (DOC)	Water	NA	SM 5310 C	125 ml amber G	AFTER FILTRATION: pH <2 with HCl or H_2SO_4, Cool 4°C	28 days

Maximum holding time allowed from date of collection.
Clean-up methods may be applicable if matrix interference is encountered. Clean-up methods may include alumina (Method 3610), florisil (Method 3620), silica gel (Method 3630), gel permeation chromatography (GPC) (Method 3640), and sulfur (Method 3660). Selection of appropriate method is based on nature of interference and target compounds.
This holding time is a contractual holding time that has been established by ARCADIS.

°C – Degrees centigrade
G – glass
MNA- Monitored Natural Attenuation
NA – Not Applicable
PE – Polyethylene
SVOCs – Semivolatile Organic Compounds
TAL – Target Analyte List OLM
TCL – Target Compound List OLM 3.2
TCLP – Toxicity Characteristic Leaching Procedure
VOCs – Volatile Organic Compounds

Table 8-1
Summary of Analyte Method Detection Limits, Reporting Limits, and Risk Screening Levels for TCL VOCs (Method 8260B)
Soil and Water Samples MQAP Addendum PBC-2
Radford Army Ammunition Plant,
Radford, Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
1,1,1-Trichloroethane	71-55-6	0.001	0.005	0.33	1		N	1.70E+03	1.70E+02	N	2.90E+05	2.90E+04	N	2.20E+04	2.20E+03	1.10E+01	3.00E-01	3.00E-02
1,1,2,2-Tetrachloroethane	79-34-5	0.001	0.005	0.33	1	--	C	5.30E-02	5.30E-02	C	1.40E+01	1.40E+01	C	3.20E+00	3.20E+00	6.10E+02	3.00E-01	1.40E+00
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.001	0.005	0.5	1	--	N	5.90E+04	5.90E+03	N	3.10E+07	3.10E+06	N	2.30E+06	2.30E+05	--	-	--
1,1,2-Trichloroethane	79-00-5	0.001	0.005	0.33	1	--	C	1.90E-01	1.90E-01	C	5.00E+01	5.00E+01	C	1.10E+01	1.10E+01	1.20E+03	3.00E-01	1.20E+00
1,1-Dichloroethane	75-34-3	0.001	0.005	0.33	1	--	N	9.00E+02	9.00E+01	N	2.00E+05	2.00E+04	N	1.60E+04	1.60E+03	4.70E+01	3.00E-01	--
1,1-Dichloroethene	75-35-4	0.001	0.005	0.42	1	--	N	3.50E+02	3.50E+01	N	5.10E+04	5.10E+03	N	3.90E+03	3.90E+02	2.50E+01	-	3.10E-02
1,2,4-Trichlorobenzene	120-82-1	0.001	0.005	0.57	2	7.00E+01	N	6.10E+01	6.10E+00	N	1.00E+04	1.00E+03	N	7.80E+02	7.80E+01	2.40E+01	1.00E-01	2.10E+00
1,2-Dibromo-3-chloropropane	96-12-8	0.001	0.005	0.33	2	-	C	2.00E-04	2.00E-04	C	3.60E+00	3.60E+00	C	2.00E-01	2.00E-01	--	-	--
1,2-Dibromoethane	106-93-4	0.001	0.005	0.33	1	-	C	5.30E-03	5.30E-03	C	1.40E+00	1.40E+00	C	3.20E-01	3.20E-01	--	5.00E+00	--
1,2-Dichlorobenzene	95-50-1	0.001	0.005	0.33	1	-	N	2.70E+02	2.70E+01	N	9.20E+04	9.20E+03	N	7.00E+03	7.00E+02	7.00E-01	1.00E-01	1.70E-02
1,2-Dichloroethane	107-06-2	0.001	0.005	0.33	1	-	C	1.20E-01	1.20E-01	C	3.10E+01	3.10E+01	C	7.00E+00	7.00E+00	1.00E+02	8.70E+02	--
1,2-Dichloropropane	78-87-5	0.001	0.005	0.33	1	5.00E+00	C	1.60E-01	1.60E-01	C	4.20E+01	4.20E+01	C	9.40E+00	9.40E+00	--	3.00E-01	--
1,3-Dichlorobenzene	541-73-1	0.001	0.005	0.38	1	-	N	1.80E+01	1.80E+00	N	3.10E+03	3.10E+02	N	2.30E+02	2.30E+01	1.50E+02	-	4.40E+00
1,4-Dichlorobenzene	106-46-7	0.001	0.005	0.33	1	-	C	4.70E-01	4.70E-01	C	1.20E+02	1.20E+02	C	2.70E+01	2.70E+01	2.60E+01	1.00E-01	6.00E-01
2-Butanone	78-93-3	0.002	0.01	1.5	10	--	N	7.00E+03	7.00E+02	N	6.10E+05	6.10E+04	N	4.70E+04	4.70E+03	1.40E+04	-	--
2-Hexanone	591-78-6	0.002	0.01	1	5	--	--	--	--	--	--	--	--	--	--	9.90E+01	-	--
4-Methyl-2-pentanone	108-10-1	0.001	0.01	1.5	5	--	N	6.30E+03	6.30E+02	--	--	--	--	--	--	1.70E+02	1.00E+02	--
Acetone	67-64-1	0.002	0.05	3.3	10	--	N	5.50E+03	5.50E+02	N	9.20E+05	9.20E+04	N	7.00E+04	7.00E+03	1.50E+03	-	--
Benzene	71-43-2	0.001	0.005	0.33	1	5.00E+00	C	3.40E-01	3.40E-01	C	5.20E+01	5.20E+01	C	1.20E+01	1.20E+01	3.70E+02	1.00E-01	--
Bromodichloromethane	75-27-4	0.001	0.005	0.33	1	8.00E+01	C	1.70E-01	1.70E-01	C	4.60E+01	4.60E+01	C	1.00E+01	1.00E+01	--	4.50E+02	--
Bromoform	75-25-2	0.001	0.005	0.5	1	8.00E+01	C	8.50E+00	8.50E+00	C	3.60E+02	3.60E+02	C	8.10E+01	8.10E+01	3.20E+02	-	6.50E-01
Bromomethane	74-83-9	0.001	0.01	0.5	2	-	N	8.50E+00	8.50E-01	N	1.40E+03	1.40E+02	N	1.10E+02	1.10E+01	--	-	--
Carbon disulfide	75-15-0	0.001	0.005	0.33	1	-	N	1.00E+03	1.00E+02	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	9.20E-01	-	8.50E-04
Carbon tetrachloride	56-23-5	0.001	0.005	0.33	1	5.00E+00	C	1.60E-01	1.60E-01	C	2.20E+01	2.20E+01	C	4.90E+00	4.90E+00	1.30E+01	3.00E-01	6.40E-02
Chlorobenzene	108-90-7	0.001	0.005	0.33	1	1.00E+02	N	9.00E+01	9.00E+00	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	1.30E+00	1.00E-01	8.40E-03
Chloroethane	75-00-3	0.001	0.01	0.5	2	-	C	3.60E+00	3.60E+00	C	9.90E+02	9.90E+02	C	2.20E+02	2.20E+02	--	-	--
Chloroform	67-66-3	0.001	0.005	0.33	1	8.00E+01	C	1.50E-01	1.50E-01	N	1.00E+04	1.00E+03	N	7.80E+02	7.80E+01	1.80E+00	3.00E-01	--
Chloromethane	74-87-3	0.001	0.01	0.5	2	-	N	1.90E+02	1.90E+01	--	--	--	--	--	--	--	-	--
cis-1,2-Dichloroethene	156-59-2	0.001	0.005	0.44	1	7.00E+01	N	6.10E+01	6.10E+00	N	1.00E+04	1.00E+03	N	7.80E+02	7.80E+01	--	3.00E-01	--
cis-1,3-Dichloropropene	10061-01-5	0.001	0.005	0.33	1	5.00E+00	C	4.40E-01	4.40E-01	C	2.90E+01	2.90E+01	C	6.40E+00	6.40E+00	--	3.00E-01	--
Cyclohexane	110-82-7	0.001	0.005	0.33	2	-	N	1.20E+04	1.20E+03	--	--	--	--	--	--	--	-	--
Dibromochloromethane	124-48-1	0.001	0.005	0.33	1	6.00E+01	C	1.30E-01	1.30E-01	C	3.40E+01	3.40E+01	C	7.60E+00	7.60E+00	--	-	--
Dichlorodifluoromethane	75-71-8	0.001	0.01	0.5	2	--	N	3.50E+02	3.50E+01	N	2.00E+05	2.00E+04	N	1.60E+04	1.60E+03	--	-	--
Ethylbenzene	100-41-4	0.001	0.005	0.35	1	7.00E+02	N	1.30E+03	1.30E+02	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	9.00E+01	1.00E-01	1.10E+00
Isopropylbenzene	98-82-8	0.001	0.005	0.33	1	--	N	6.60E+02	6.60E+01	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	2.60E+00	-	8.60E-02
Methyl acetate	79-20-9	0.002	0.005	0.87	2	--	N	6.10E+03	6.10E+02	N	1.00E+06	1.00E+05	N	7.80E+04	7.80E+03	--	-	--
methyl tert-Butyl ether	1634-04-4	0.001	0.005	0.33	1	--	C	2.60E+00	2.60E+00	C	7.20E+02	7.20E+02	C	1.60E+02	1.60E+02	1.10E+04	-	--

Table 8-1
Summary of Analyte Method Detection Limits, Reporting Limits, and Risk Screening Levels for TCL VOCs (Method 8260B)
Soil and Water Samples MQAP Addendum PBC-2
Radford Army Ammunition Plant,
Radford, Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Methylcyclohexane	108-87-2	0.001	0.005	0.33	1	--	N	6.30E+03	6.30E+02	--	--	--	--	--	--	--	-	--
Methylene chloride	75-09-2	0.001	0.04	0.66	2	--	C	4.10E+00	4.10E+00	C	3.80E+02	3.80E+02	C	8.50E+01	8.50E+01	9.80E+01	3.00E-01	--
Styrene	100-42-5	0.001	0.005	0.33	1	1.00E+02	N	1.60E+03	1.60E+02	N	2.00E+05	2.00E+04	N	1.60E+04	1.60E+03	7.20E+01	1.00E-01	5.60E-01
Tetrachloroethene	127-18-4	0.001	0.005	0.33	1	5.00E+00	C	1.00E-01	1.00E-01	C	5.30E+00	5.30E+00	C	1.20E+00	1.20E+00	1.10E+02	3.00E-01	4.70E-01
Toluene	108-88-3	0.001	0.005	0.33	1	1.00E+03	N	2.30E+03	2.30E+02	N	8.20E+04	8.20E+03	N	6.30E+03	6.30E+02	2.00E+00	1.00E-01	--
trans-1,2-Dichloroethene	156-60-5	0.001	0.005	0.4	1	1.00E+02	N	1.10E+02	1.10E+01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	9.70E+02	3.00E-01	1.10E+00
trans-1,3-Dichloropropene	10061-02-6	0.001	0.005	0.33	1	-	C	4.40E-01	4.40E-01	C	2.90E+01	2.90E+01	C	6.40E+00	6.40E+00	--	3.00E-01	--
Trichloroethene	79-01-6	0.001	0.005	0.33	1	5.00E+00	C	2.60E-02	2.60E-02	C	7.20E+00	7.20E+00	C	1.60E+00	1.60E+00	2.10E+01	3.00E-01	9.70E-02
Trichlorofluoromethane	75-69-4	0.001	0.01	0.5	2		N	1.30E+03	1.30E+02	N	3.10E+05	3.10E+04	N	2.30E+04	2.30E+03		-	--
Vinyl Chloride	75-01-4	0.001	0.01	0.5	2	2.00E+00	C	1.50E-02	1.50E-02	-	--	-	C	9.00E-02	9.00E-02	9.30E+02	3.00E-01	--
Xylenes	1330-20-7	0.002	0.005	0.33	1	1.00E+04	N	2.10E+02	2.10E+01	N	2.00E+05	2.00E+04	N	1.60E+04	1.60E+03	1.30E+01	1.00E-01	--

Notes:

(a) Method Detection Limits and Reporting Limits provided by Empirical Laboratories, LLC

(b) USEPA Region 3 Risk-based Concentrations (October 2007)

(c) BTAG Screening Levels [1995 (soil), 2004 (surface water and sediment)].

Acronyms:

-- = Screening level unavailable.
BTAG = Biological Technical Assistance Group
CAS = Chemical Abstract Service
C!/N = RBC at HI of 0.1 < RBC-c; RBC from alternate RBC table.
C= RBC based cancer endpoint.
MCL = Maximum Contaminant Level
MDL = Method Detection Limit
mg/kg = Milligram Per kilogram
N = RBC based on non-carcinogenic endpoint.
PCBs = Polychlorinated Biphenyls
RBC = USEPA Region III Risk
RL = Reporting Limit
TCL = Target Compound List
ug/L = Microgram Per liter
VOC = volatile organic compound

Table 8-2
Summary of Analyte Method Detection Limits, Reporting Limits, and Risk Screening Levels for TCL SVOCs (Method 8270C)
Soil and Water Samples MQAP Addendum - PBC2
Radford Army Ammunition Plant,
Radford, Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	M ug/L	M ug/L	M ug/L		M ug/L	M ug/L		mg/kg	mg/kg		mg/kg	mg/kg	M ug/L	mg/kg	mg/kg
1,1'-Biphenyl	92-52-4	0.1	0.33	1	5		N	3.00E+02	3.00E+01	N	5.10E+04	5.10E+03	N	3.90E+03	3.90E+02	1.40E+01	-	1.20E+00
2,2'-oxybis(1-Chloropropane)	108-60-1	0.1	0.33	1	5	--	C		2.60E-01	C	4.10E+01	4.10E+01	C	9.10E+00	9.10E+00	--	-	--
2,4,5-Trichlorophenol	95-95-4	0.1	0.33	1	5	--	N	3.70E+03	3.70E+02	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	--	1.00E-01	--
2,4,6-Trichlorophenol	88-06-2	0.1	0.33	1	5	--	C	6.10E+00	6.10E+00	C	2.60E+02	2.60E+02	C	5.80E+01	5.80E+01	4.90E+00	1.00E-01	2.10E-01
2,4-Dichlorophenol	120-83-2	0.1	0.33	1	5	--	N	1.10E+02	1.10E+01	N	3.10E+03	3.10E+02	N	2.30E+02	2.30E+01	1.10E+01	1.00E-01	1.20E-01
2,4-Dimethylphenol	105-67-9	0.1	1.3	2	20	--	N	7.30E+02	7.30E+01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	--	1.00E-01	2.90E-02
2,4-Dinitrophenol	51-28-5	0.167	3.3	7	50	--	N	7.30E+01	7.30E+00	N	2.00E+03	2.00E+02	N	1.60E+02	1.60E+01	--	1.00E-01	--
2,4-Dinitrotoluene	121-14-2	0.1	0.33	1	5	--	N	7.30E+01	7.30E+00	N	2.00E+03	2.00E+02	N	1.60E+02	1.60E+01	4.40E+01	-	4.20E-02
2,6-Dinitrotoluene	606-20-2	0.1	0.33	1	5	--	N	3.70E+01	3.70E+00	N	1.00E+03	1.00E+02	N	7.80E+01	7.80E+00	8.10E+01	-	--
2-Chloronaphthalene	91-58-7	0.1	0.33	1.5	5	--	N	4.90E+02	4.90E+01	N	8.20E+04	8.20E+03	N	6.30E+03	6.30E+02	--	-	--
2-Chlorophenol	95-57-8	0.1	0.33	1.5	5	--	N	3.00E+01	3.00E+00	N	5.10E+03	5.10E+02	N	3.90E+02	3.90E+01	2.40E+01	1.00E-01	3.10E-02
2-Methylnaphthalene	91-57-6	0.1	0.33	1	5	--	N	2.40E+01	2.40E+00	N	4.10E+03	4.10E+02	N	3.10E+02	3.10E+01	4.70E+00	-	2.00E-02
2-Methylphenol	95-48-7	0.1	0.33	1	5	--	N	1.80E+03	1.80E+02	N	5.10E+04	5.10E+03	N	3.90E+03	3.90E+02	1.30E+01	1.00E-01	--
2-Nitroaniline	88-74-4	0.1	1.3	1	20	--	--	--	--	--	--	--	--	--	--	--	-	--
2-Nitrophenol	88-75-5	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	1.90E+03	-	--
3,3'-Dichlorobenzidine	91-94-1	0.167	0.33	1.5	5	--	C	1.50E-01	1.50E-01	C	6.40E+00	6.40E+00	C	1.40E+00	1.40E+00	4.50E+00	-	1.30E-01
3-Nitroaniline	99-09-2	0.167	1.3	1.5	20	--	--	--	--	--	--	--	--	--	--	--	-	--
4,6-Dinitro-2-methylphenol	534-52-1	0.167	1.3	2.5	20	--	--	--	--	--	--	--	--	--	--	--	-	--
4-Bromophenyl-phenylether	101-55-3	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	1.50E+00	-	1.20E+00
4-Chloro-3-Methylphenol	59-50-7	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	--	-	--
4-Chloroaniline	106-47-8	0.1	0.33	1	5	--	N	1.50E+02	1.50E+01	N	4.10E+03	4.10E+02	N	3.10E+02	3.10E+01	2.30E+02	-	--
4-Chlorophenyl-phenylether	7005-72-3	0.1	0.33	1.5	5	--	--	--	--	--	--	--	--	--	--	--	-	0.00E+00
4-Methylphenol	106-44-5	0.1	0.33	1	5	--	N	1.80E+02	1.80E+01	N	5.10E+03	5.10E+02	N	3.90E+02	3.90E+01	5.40E+02	1.00E-01	6.70E-01
4-Nitroaniline	100-01-6	0.1	1.3	1	20	--	--	--	--	--	--	--	--	--	--	--	-	--
4-Nitrophenol	100-02-7	0.1	1.3	3	20	--	-	--	-	-	--	-	-	--	-	6.00E+01	1.00E-01	--
Acenaphthene	83-32-9	0.1	0.33	1.5	5	--	N	3.70E+02	3.70E+01	N	6.10E+04	6.10E+03	N	4.70E+03	4.70E+02	5.80E+00	1.00E-01	6.70E-03
Acenaphthylene [1]	208-96-8	0.1	0.33	1.5	5	--	N	1.80E+02	1.80E+01	N	3.10E+04	3.10E+03	N	2.30E+03	2.30E+02	--	1.00E-01	5.90E-03
Acetophenone	98-86-2	0.1	0.33	1	5	--	N	6.10E+02	6.10E+01	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	--	-	--
Anthracene	120-12-7	0.1	0.33	1	5	--	N	1.80E+03	1.80E+02	N	3.10E+05	3.10E+04	N	2.30E+04	2.30E+03	1.20E-02	1.00E-01	5.70E-02
Atrazine	1912-24-9	0.1	0.33	1	5	3.00E+00	C	3.00E-01	3.00E-01	C	1.30E+01	1.30E+01	C	2.90E+00	2.90E+00	1.80E+00	-	6.60E-03
Benzaldehyde	100-52-7	0.1	0.33	1	5	--	N	3.70E+03	3.70E+02	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	--	-	--
Benzo(a)anthracene	56-55-3	0.1	0.33	1	5	--	C	3.00E-02	3.00E-02	C	3.90E+00	3.90E+00	C	2.20E-01	2.20E-01	1.80E-02	1.00E-01	1.10E-01
Benzo(a)pyrene	50-32-8	0.1	0.33	1	5	2.00E-01	C	3.00E-03	3.00E-03	C	3.90E-01	3.90E-01	C	2.20E-02	2.20E-02	1.50E-02	1.00E-01	1.50E-01
Benzo(b)fluoranthene	205-99-2	0.1	0.33	1	5	--	C	3.00E-02	3.00E-02	C	3.90E+00	3.90E+00	C	2.20E-01	2.20E-01	--	1.00E-01	--
Benzo(g,h,i)perylene [1]	191-24-2	0.1	0.33	1.5	5	--	N	1.80E+02	1.80E+01	N	3.10E+04	3.10E+03	N	2.30E+03	2.30E+02	--	1.00E-01	1.70E-01
Benzo(k)fluoranthene	207-08-9	0.1	0.33	1	5	--	C	3.00E-01	3.00E-01	C	3.90E+01	3.90E+01	C	2.20E+00	2.20E+00	--	1.00E-01	2.40E-01
Bis(2-chloroethoxy)methane	111-91-1	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	--	-	--

Table 8-2
Summary of Analyte Method Detection Limits, Reporting Limits, and Risk Screening Levels for TCL SVOCs (Method 8270C)
Soil and Water Samples MQAP Addendum - PBC2
Radford Army Ammunition Plant,
Radford, Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	M ug/L	M ug/L	M ug/L		M ug/L	M ug/L		mg/kg	mg/kg		mg/kg	mg/kg	M ug/L	mg/kg	mg/kg
Bis(2-chloroethyl)ether	111-44-4	0.167	0.33	2.5	2	--	C	9.60E-03	9.60E-03	C	2.60E+00	2.60E+00	C	5.80E-01	5.80E-01	--	-	--
Bis(2-ethylhexyl)phthalate	117-81-7	0.1	0.33	1	5	6.00E+00	C	4.80E+00	4.80E+00	C	2.00E+02	2.00E+02	C	4.60E+01	4.60E+01	1.60E+01	-	1.80E-01
Butylbenzylphthalate	85-68-7	0.1	0.33	1	5	--	N	7.30E+03	7.30E+02	N	2.00E+05	2.00E+04	N	1.60E+04	1.60E+03	1.90E+01	-	1.10E+01
Caprolactam	105-60-2	0.1	0.33	1	5	--	N	1.80E+04	1.80E+03	N	5.10E+05	5.10E+04	N	3.90E+04	3.90E+03	--	-	--
Carbazole	86-74-8	0.1	0.67	1	10	--	C	3.30E+00	3.30E+00	C	1.40E+02	1.40E+02	C	3.20E+01	3.20E+01	--	-	--
Chrysene	218-01-9	0.1	0.33	1	5	--	C	3.00E+00	3.00E+00	C	3.90E+02	3.90E+02	C	2.20E+01	2.20E+01	--	1.00E-01	1.70E-01
Dibenz(a,h)anthracene	53-70-3	0.1	0.33	1	5	--	C	3.00E-03	3.00E-03	C	3.90E-01	3.90E-01	C	2.20E-02	2.20E-02	--	1.00E-01	3.30E-02
Dibenzofuran	132-64-9	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	3.70E+00	-	4.20E-01
Diethylphthalate	84-66-2	0.1	0.33	1	5	--	N	2.90E+04	2.90E+03	N	8.20E+05	8.20E+04	N	6.30E+04	6.30E+03	2.10E+02	-	6.00E-01
Dimethylphthalate	131-11-3	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	--	-	--
Di-n-butylphthalate	84-74-2	0.1	0.33	1	5	--	N	3.70E+03	3.70E+02	N	1.00E+05	1.00E+04	N	7.80E+03	7.80E+02	1.90E+01	-	6.50E+00
Di-n-octylphthalate	117-84-0	0.1	0.33	1	5	--	--	--	--	--	--	--	--	--	--	2.20E+01	-	--
Fluoranthene	206-44-0	0.1	0.33	1	5	--	N	1.50E+03	1.50E+02	N	4.10E+04	4.10E+03	N	3.10E+03	3.10E+02	4.00E-02	1.00E-01	4.20E-01
Fluorene	86-73-7	0.1	0.33	1.5	5		N	2.40E+02	2.40E+01	N	4.10E+04	4.10E+03	N	3.10E+03	3.10E+02	3.00E+00	1.00E-01	7.70E-02
Hexachlorobenzene	118-74-1	0.1	0.33	1	5	1.00E+00	C	4.20E-02	4.20E-02	C	1.80E+00	1.80E+00	C	4.00E-01	4.00E-01	3.00E-04	-	2.00E-02
Hexachlorobutadiene	87-68-3	0.1	0.33	1.5	5	--	C!/N	8.60E-01	7.30E-01	C!/N	3.70E+01	2.00E+01	C!/N	8.20E+00	1.60E+00	1.30E+00	-	--
Hexachlorocyclopentadiene	77-47-4	0.1	0.33	1	5	5.00E+01	N	2.20E+02	2.20E+01	N	6.10E+03	6.10E+02	N	4.70E+02	4.70E+01	--	-	--
Hexachloroethane	67-72-1	0.1	0.33	2.5	5	--	C!/N	4.80E+00	3.70E+00	C!/N	2.00E+02	1.00E+02	C!/N	4.60E+01	7.80E+00	1.20E+01	-	1.00E+00
Indeno(1,2,3-cd)pyrene	193-39-5	0.15	0.33	1.5	5	--	C	3.00E-02	3.00E-02	C	3.90E+00	3.90E+00	C	2.20E-01	2.20E-01	--	1.00E-01	1.70E-02
Isophorone	78-59-1	0.1	0.33	1	5	--	C	7.00E+01	7.00E+01	C	3.00E+03	3.00E+03	C	6.70E+02	6.70E+02	--	-	--
Naphthalene	91-20-3	0.1	0.33	1.5	5	--	N	6.50E+00	6.50E-01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	1.10E+00	1.00E-01	1.80E-01
Nitrobenzene	98-95-3	0.1	0.33	1	5	--	N	3.50E+00	3.50E-01	N	5.10E+02	5.10E+01	N	3.90E+01	3.90E+00	--	-	--
N-Nitrosodi-n-propylamine	621-64-7	0.1	0.33	1.5	5	--	C	9.60E-03	9.60E-03	C	4.10E-01	4.10E-01	C	9.10E-02	9.10E-02	--	-	--
N-Nitrosodiphenylamine	86-30-6	0.1	0.33	1	5	--	C	1.40E+01	1.40E+01	C	5.80E+02	5.80E+02	C	1.30E+02	1.30E+02	2.10E+02	-	2.70E+00
Pentachlorophenol	87-86-5	0.1	1.3	1.5	20	1.00E+00	C	5.60E-01	5.60E-01	C	2.40E+01	2.40E+01	C	5.30E+00	5.30E+00	5.00E-01	1.00E-01	5.00E-01
Phenol	108-95-2	0.1	0.33	1	5	--	N	1.10E+04	1.10E+03	N	3.10E+05	3.10E+04	N	2.30E+04	2.30E+03	4.00E+00	1.00E-01	4.20E-01
Pyrene	129-00-0	0.1	0.33	1	5	--	N	1.80E+02	1.80E+01	N	3.10E+04	3.10E+03	N	2.30E+03	2.30E+02	2.50E-02	1.00E-01	2.00E-01
Acenaphthene	83-32-9	0.0014	0.0033	0.011	0.05	--	N	3.70E+02	3.70E+01	N	6.10E+04	6.10E+03	N	4.70E+03	4.70E+02	5.80E+00	1.00E-01	6.70E-03
Acenaphthylene [1]	208-96-8	0.00082	0.0033	0.019	0.05	--	N	1.80E+02	1.80E+01	N	3.10E+04	3.10E+03	N	2.30E+03	2.30E+02	--	1.00E-01	5.90E-03
Anthracene	120-12-7	0.00069	0.0033	0.021	0.05	--	N	1.80E+03	1.80E+02	N	3.10E+05	3.10E+04	N	2.30E+04	2.30E+03	1.20E-02	1.00E-01	5.70E-02
Benzo(a)anthracene	56-55-3	0.00131	0.0033	0.017	0.05	--	C	3.00E-02	3.00E-02	C	3.90E+00	3.90E+00	C	2.20E-01	2.20E-01	1.80E-02	1.00E-01	1.10E-01
Benzo(a)pyrene	50-32-8	0.00118	0.0033	0.017	0.05	2.00E-01	C	3.00E-03	3.00E-03	C	3.90E-01	3.90E-01	C	2.20E-02	2.20E-02	1.50E-02	1.00E-01	1.50E-01
Benzo(b)fluoranthene	205-99-2	0.00126	0.0033	0.018	0.05	--	C	3.00E-02	3.00E-02	C	3.90E+00	3.90E+00	C	2.20E-01	2.20E-01	--	1.00E-01	--
Benzo(g,h,i)perylene [1]	191-24-2	0.0022	0.0033	0.013	0.05	--	N	1.80E+02	1.80E+01	N	3.10E+04	3.10E+03	N	2.30E+03	2.30E+02	--	1.00E-01	1.70E-01
Benzo(k)fluoranthene	207-08-9	0.00123	0.0033	0.012	0.05	--	C	3.00E-01	3.00E-01	C	3.90E+01	3.90E+01	C	2.20E+00	2.20E+00	--	1.00E-01	2.40E-01
Chrysene	218-01-9	0.00094	0.0033	0.012	0.05	--	C	3.00E+00	3.00E+00	C	3.90E+02	3.90E+02	C	2.20E+01	2.20E+01	--	1.00E-01	1.70E-01
Dibenz(a,h)anthracene	53-70-3	0.00085	0.0033	0.02	0.005	--	C	3.00E-03	3.00E-03	C	3.90E-01	3.90E-01	C	2.20E-02	2.20E-02	--	1.00E-01	3.30E-02
Fluoranthene	206-44-0	0.00093	0.0033	0.016	0.05	--	N	1.50E+03	1.50E+02	N	4.10E+04	4.10E+03	N	3.10E+03	3.10E+02	4.00E-02	1.00E-01	4.20E-01

Table 8-2
Summary of Analyte Method Detection Limits, Reporting Limits, and Risk Screening Levels for TCL SVOCs (Method 8270C)
Soil and Water Samples MQAP Addendum - PBC2
Radford Army Ammunition Plant,
Radford, Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	M ug/L	M ug/L	M ug/L		M ug/L	M ug/L		mg/kg	mg/kg		mg/kg	mg/kg	M ug/L	mg/kg	mg/kg
Fluorene	86-73-7	0.00093	0.0033	0.016	0.05		N	2.40E+02	2.40E+01	N	4.10E+04	4.10E+03	N	3.10E+03	3.10E+02	3.00E+00	1.00E-01	7.70E-02
2-Methylnaphthalene	91-57-6	0.0013	0.0033	0.018	0.05	--	N	2.40E+01	2.40E+00	N	4.10E+03	4.10E+02	N	3.10E+02	3.10E+01	4.70E+00	-	2.00E-02
Indeno(1,2,3-cd)pyrene	193-39-5	0.00108	0.0033	0.018	0.05	--	C	3.00E-02	3.00E-02	C	3.90E+00	3.90E+00	C	2.20E-01	2.20E-01	--	1.00E-01	1.70E-02
Naphthalene	91-20-3	0.00158	0.0033	0.01	0.05	--	N	6.50E+00	6.50E-01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	1.10E+00	1.00E-01	1.80E-01
Pyrene	129-00-0	0.00072	0.0033	0.024	0.05	--	N	1.80E+02	1.80E+01	N	3.10E+04	3.10E+03	N	2.30E+03	2.30E+02	2.50E-02	1.00E-01	2.00E-01

Notes:

(a) Method Detection Limits and Reporting Limits provided by Empirical Laboratories, LLC

(b) USEPA Region 3 Risk-based Concentrations (October 2007)

(c) BTAG Screening Levels [1995 (soil), 2004 (surface water and sediment)].

Acronyms:

-- = Screening level unavailable.

BTAG = Biological Technical Assistance Group

CAS = Chemical Abstract Service

C!/N = RBC at HI of 0.1 < RBC-c; RBC from alternate RBC table.

C= RBC based cancer endpoint.

MCL = Maximum Contaminant Level

MDL = Method Detection Limit

mg/kg = Milligram Per kilogram

N = RBC based on non-carcinogenic endpoint.

PCBs = Polychlorinated Biphenyls

RBC = USEPA Region III Risk

RL = Reporting Limit

SVOC = Semivolatile organic compound

TCL = Target Compound List

ug/L = Microgram Per liter

Table 8-3
Summary of Analyte Detection Limits, Reporting Limits, and Risk Screening Levels for TAL Metals
(Methods 6010, 6020, 7470)
Soil and Water Samples MQAP Addendum - PBC2
Radford Army Ammunition Plant,
Radford Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Aluminum	7429-90-5	15	40	75	200		N	3.70E+04	3.70E+03	N	1.00E+06	1.00E+05	N	7.80E+04	7.80E+03	8.70E+01	1.00E+00	--
Antimony	7440-36-0	1	3	5	15	6.00E+00	N	1.50E+01	1.50E+00	N	4.10E+02	4.10E+01	N	3.10E+01	3.10E+00	3.00E+01	4.80E-01	2.00E+00
Arsenic	7440-38-2	0.6	2	3	10	1.00E+01	C	4.50E-02	4.50E-02	C	1.90E+00	1.90E+00	C	4.30E-01	4.30E-01	5.00E+00	3.30E+02	9.80E+00
Barium	7440-39-3	1	40	5	200	2.00E+03	N	7.30E+03	7.30E+02	N	2.00E+05	2.00E+04	N	1.60E+04	1.60E+03	4.00E+00	4.40E+02	--
Beryllium	7440-41-7	0.2	1	1	5	4.00E+00	N	7.30E+01	7.30E+00	N	2.00E+03	2.00E+02	N	1.60E+02	1.60E+01	6.60E-01	2.00E-02	--
Cadmium	7440-43-9	0.2	1	1	5	5.00E+00	N	1.80E+01	1.80E+00	N	5.10E+02	5.10E+01	N	3.90E+01	3.90E+00	2.50E-01	2.50E+00	9.90E-01
Calcium	7440-70-2	200	1000	1000	5000	--	--	--	--	--	-	--	--	--	--	1.20E+05	--	--
Chromium	7440-47-3	0.4	2	2	10	1.00E+02	N	1.10E+02	1.10E+01	N	3.10E+03	3.10E+02	N	2.30E+02	2.30E+01	8.50E+01	7.50E-03	4.30E+01
Cobalt	7440-48-4	1	3	5	15	--	--	--	--	--	-	--	--	--	--	2.30E+01	1.00E+02	5.00E+01
Copper	7440-50-8	1	5	5	25	1.30E+03	N	1.50E+03	1.50E+02	N	4.10E+04	4.10E+03	N	3.10E+03	3.10E+02	9.00E+00	1.50E+01	3.20E+01
Cyanide	57-12-5	0.25	10	0.125	5	2.00E+02	N	7.30E+02	7.30E+01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	5.00E+00	5.00E-03	1.00E-01
Iron	7439-89-6	6	20	30	100	--	N	2.60E+04	2.60E+03	N	7.20E+05	7.20E+04	N	5.50E+04	5.50E+03	3.00E+02	1.20E+01	2.00E+04
Lead[2]	7439-92-1	0.3	0.6	1.5	3	1.50E+01	--	--	--	--	7.50E+02	7.50E+02	--	4.00E+02	4.00E+02	2.50E+00	1.00E-02	3.60E+01
Magnesium	7439-95-4	200	1000	1000	5000	--	--	--	--	--	-	--	--	--	--	8.20E+04	4.40E+03	--
Manganese	7439-96-5	0.6	3	5	15	--	N	7.30E+02	7.30E+01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	1.20E+02	3.30E+02	4.60E+02
Mercury[3]	7439-97-6	0.013	0.033	0.08	0.2	2.00E+00	--	--	--	N	3.10E+02	3.10E+01	N	2.30E+01	2.30E+00	1.00E-01	5.80E-02	1.80E-01
Nickel	7440-02-0	1	8	5	10	--	N	7.30E+02	7.30E+01	N	2.00E+04	2.00E+03	N	1.60E+03	1.60E+02	5.20E+01	2.00E+00	2.30E+01
Potassium	7440-09-7	200	500	1000	2000	--	--	--	--	--	-	--	--	--	--	--	--	--
Selenium	7782-49-2	0.6	1	5	10	5.00E+01	N	1.80E+02	1.80E+01	N	5.10E+03	5.10E+02	N	3.90E+02	3.90E+01	1.00E+00	1.80E+00	2.00E+00
Silver	7440-22-4	0.2	2	2	10	--	N	1.80E+02	1.80E+01	N	5.10E+03	5.10E+02	N	3.90E+02	3.90E+01	3.20E+00	9.80E-06	1.00E+00
Sodium	7440-23-5	200	1000	1000	5000	--	--	--	--	--	-	--	--	--	--	6.80E+05	--	--
Thallium	7440-28-0	0.6	2	3	10	2.00E+00	N	2.60E+00	2.60E-01	N	7.20E+01	7.20E+00	N	5.50E+00	5.50E-01	8.00E-01	1.00E-03	--

Table 8-3
Summary of Analyte Detection Limits, Reporting Limits, and Risk Screening Levels for TAL Metals
(Methods 6010, 6020, 7470)
Soil and Water Samples MQAP Addendum - PBC2
Radford Army Ammunition Plant,
Radford Virginia

Compound	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Vanadium	7440-62-2	1	10	5	50	--	N	3.70E+01	3.70E+00	N	1.00E+03	1.00E+02	N	7.80E+01	7.80E+00	2.00E+01	5.00E-01	--
Zinc	7440-66-6	1	4	10	20	--	N	1.10E+04	1.10E+03	N	3.10E+05	3.10E+04	N	2.30E+04	2.30E+03	1.20E+02	1.00E+01	1.20E+02

Notes:

(a) Method Detection Limits and Reporting Limits provided by Empirical Laboratories, LLC

(b) USEPA Region 3 Risk-based Concentrations (October 2007)

(c) BTAG Screening Levels [1995 (soil), 2004 (surface water and sediment)].

Acronyms:

-- = Screening level unavailable.
BTAG = Biological Technical Assistance Group
CAS = Chemical Abstract Service
C!/N = RBC at HI of 0.1 < RBC-c; RBC from alternate RBC table.
C= RBC based cancer endpoint.
MCL = Maximum Contaminant Level
MDL = Method Detection Limit
mg/kg = Milligram Per kilogram
N = RBC based on non-carcinogenic endpoint.
PCBs = Polychlorinated Biphenyls
RBC = USEPA Region III Risk
RL = Reporting Limit
TCL = Target Compound List
ug/L = Microgram Per liter

Table 8-4
Summary of Analyte MDLs, Reporting Limits, and Risk Screening Levels for TCL Pesticides (8081A), and PCBs (8082), and Herbicides (8151)
Radford Army Ammunition Plant, Radford, Virginia

	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Pesticides by Method 8081A																		
4,4'-DDD	72-54-8	0.0002	0.0005	0.005	0.015		C	2.80E-01	2.80E-01	C	1.20E+01	1.20E+01	C	2.70E+00	2.70E+00	1.10E-02	1.00E-01	4.90E-03
4,4'-DDE	72-55-9	0.0002	0.0005	0.005	0.015	--	C	2.00E-01	2.00E-01	C	8.40E+00	8.40E+00	C	1.90E+00	1.90E+00	--	1.00E-01	3.20E-03
4,4'-DDT	50-29-3	0.0002	0.0005	0.005	0.015	--	C	2.00E-01	2.00E-01	C	8.40E+00	8.40E+00	C	1.90E+00	1.90E+00	1.00E-03	1.00E-01	--
Aldrin	309-00-2	0.0002	0.0005	0.005	0.015	--	C	3.90E-03	3.90E-03	C	1.70E-01	1.70E-01	C	3.80E-02	3.80E-02	3.00E+00	1.00E-01	2.00E-03
alpha-BHC	319-84-6	0.0002	0.0005	0.005	0.015	--	C	1.10E-02	1.10E-02	C	4.50E-01	4.50E-01	C	1.00E-01	1.00E-01	--	1.00E+02	6.00E-03
alpha-Chlordane	5103-71-9	0.0002	0.0005	0.005	0.015	--	C	1.90E-01	1.90E-01	C	8.20E+00	8.20E+00	C	1.80E+00	1.80E+00	--	1.00E-01	--
gamma-Chlordane	5103-74-2	0.0002	0.0005	0.005	0.015	--	C	1.90E-01	1.90E-01	C	8.20E+00	8.20E+00	C	1.80E+00	1.80E+00	--	1.00E-01	--
beta-BHC	319-85-7	0.0002	0.0005	0.005	0.015	--	C	3.70E-02	3.70E-02	C	1.60E+00	1.60E+00	C	3.50E-01	3.50E-01	--	1.00E+02	5.00E-03
delta-BHC	319-86-8	0.0002	0.0005	0.005	0.015	--	C	1.10E-02	1.10E-02	C	4.50E-01	4.50E-01	C	1.00E-01	1.00E-01	1.40E+02	1.00E+02	6.40E+00
Dieldrin	60-57-1	0.0002	0.0005	0.005	0.015	--	C	4.20E-03	4.20E-03	C	1.80E-01	1.80E-01	C	4.00E-02	4.00E-02	5.60E-02	1.00E-01	1.90E-03
Endosulfan I	959-98-8	0.0002	0.0005	0.005	0.015	--	N	2.20E+02	2.20E+01	N	6.10E+03	6.10E+02	N	4.70E+02	4.70E+01	5.10E-02	-	2.90E-03
Endosulfan II	33213-65-9	0.0002	0.0005	0.005	0.015	--	N	2.20E+02	2.20E+01	N	6.10E+03	6.10E+02	N	4.70E+02	4.70E+01	5.10E-02	-	1.40E-02
Endosulfan sulfate	1031-07-8	0.0002	0.0005	0.005	0.015	--	N	2.20E+02	2.20E+01	N	6.10E+03	6.10E+02	N	4.70E+02	4.70E+01	--	-	5.40E-03
Endrin	72-20-8	0.0002	0.0005	0.005	0.015	2.00E+00	N	1.10E+01	1.10E+00	N	3.10E+02	3.10E+01	N	2.30E+01	2.30E+00	3.60E-02	1.00E-01	2.20E-03
Endrin aldehyde	7421-93-4	0.0002	0.0005	0.005	0.015	--	N	1.10E+01	1.10E+00	N	3.10E+02	3.10E+01	N	2.30E+01	2.30E+00	--	1.00E-01	--
Endrin ketone	53494-70-5	0.0002	0.0005	0.005	0.015	--	N	1.10E+01	1.10E+00	N	3.10E+02	3.10E+01	N	2.30E+01	2.30E+00	--	1.00E-01	--
gamma-BHC (Lindane)	58-89-9	0.0002	0.0005	0.005	0.015	2.00E-01	C	5.20E-02	5.20E-02	C	2.20E+00	2.20E+00	C	4.90E-01	4.90E-01	--	1.00E-01	--
Heptachlor	76-44-8	0.0002	0.0005	0.005	0.015	4.00E-01	C	1.50E-02	1.50E-02	C	6.40E-01	6.40E-01	C	1.40E-01	1.40E-01	3.80E-03	1.00E-01	6.80E-02
Heptachlor epoxide	1024-57-3	0.0002	0.0005	0.005	0.015	2.00E-01	C	7.40E-03	7.40E-03	C	3.10E-01	3.10E-01	C	7.00E-02	7.00E-02	3.80E-03	1.00E-01	2.50E-03
Methoxychlor	72-43-5	0.0002	0.0005	0.005	0.015	4.00E+01	N	1.80E+02	1.80E+01	N	5.10E+03	5.10E+02	N	3.90E+02	3.90E+01	1.90E-02	1.00E-01	1.90E-02
Toxaphene	8001-35-2	0.011	0.033	0.33	1	3.00E+00	C	6.10E-02	6.10E-02	C	2.60E+00	2.60E+00	C	5.80E-01	5.80E-01	2.00E-04	-	1.00E-03
Polychlorinated Biphenyls by Method 8082																		
Aroclor 1016	12674-11-2	0.005	0.017	0.125	0.5	0.5	C!/N	9.60E-01	2.60E-01	C!/N	4.10E+01	7.20E+00	N	5.50E+00	5.50E-01	7.40E-05	1.00E-01	--
Aroclor 1221	11104-28-2	0.005	0.017	0.125	0.5	0.5	C	3.30E-02	3.30E-02	C	1.40E+00	1.40E+00	C	3.20E-01	3.20E-01	7.40E-05	1.00E-01	--
Aroclor 1232	11141-16-5	0.005	0.017	0.125	0.5	0.5	C	3.30E-02	3.30E-02	C	1.40E+00	1.40E+00	C	3.20E-01	3.20E-01	7.40E-05	1.00E-01	--
Aroclor 1242	53469-21-9	0.005	0.017	0.125	0.5	0.5	C	3.30E-02	3.30E-02	C	1.40E+00	1.40E+00	C	3.20E-01	3.20E-01	7.40E-05	1.00E-01	--
Aroclor 1248	12672-29-6	0.005	0.017	0.125	0.5	0.5	C	3.30E-02	3.30E-02	C	1.40E+00	1.40E+00	C	3.20E-01	3.20E-01	7.40E-05	1.00E-01	--
Aroclor 1254	11097-69-1	0.005	0.017	0.125	0.5	0.5	C	3.30E-02	3.30E-02	C	1.40E+00	1.40E+00	C!/N	3.20E-01	1.60E-01	7.40E-05	1.00E-01	--
Aroclor 1260	11096-82-5	0.005	0.017	0.125	0.5	0.5	C	3.30E-02	3.30E-02	C	1.40E+00	1.40E+00	C	3.20E-01	3.20E-01	7.40E-05	1.00E-01	--
Herbicides by Method 8151																		
2,4,5-T	93-76-5	0.0025	0.0075	0.025	0.075	--	N	3.65E+02	3.65E+01	N	1.02E+04	1.02E+03	N	7.82E+02	7.82E+01	686	--	12.3
2,4,5-TP (Silvex)	93-72-1	0.025	0.0075	0.025	0.075	5.00E+01	N	2.92E+02	2.92E+01	N	8.18E+03	8.18E+02	N	6.26E+02	6.26E+01	30	--	0.675
2,4-D	94-75-7	0.025	0.075	0.25	0.75	7.00E+01	N	3.65E+02	3.65E+01	N	1.02E+04	1.02E+03	N	7.82E+02	7.82E+01	--	--	--
2-4-DB	94-82-6	0.025	0.075	0.25	0.75	--	N	2.92E+02	2.92E+01	N	8.18E+03	8.18E+02	N	6.26E+02	6.26E+01	--	--	--

Table 8-4
Summary of Analyte MDLs, Reporting Limits, and Risk Screening Levels for TCL Pesticides (8081A), and PCBs (8082), and Herbicides (8151)
Radford Army Ammunition Plant, Radford, Virginia

	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/kg	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Dalapon	75-99-0	0.0625	0.19	0.625	1.9	2.00E+02	N	1.10E+03	1.10E+02	N	3.07E+04	3.07E+03	N	2.35E+03	2.35E+02	--	--	--
Dicamba	1918-00-9	0.0625	0.19	0.625	1.9	--	N	1.10E+03	1.10E+02	N	3.07E+04	3.07E+03	N	2.35E+03	2.35E+02	--	--	--
Dichlorprop	120-36-5	0.025	0.075	0.25	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--
Dinoseb	88-85-7	0.0125	0.038	0.125	0.38	7.00E+00	N	3.65E+01	3.65E+00	N	1.02E+03	1.02E+02	N	7.82E+01	7.82E+00	0.05	--	0.000611
MCPA	94-74-6	2.5	7.5	25	75	--	N	1.83E+01	1.83E+00	N	5.11E+02	5.11E+01	N	3.91E+01	3.91E+00	--	--	--
MCPP (Mecoprop)	93-65-2	2.5	7.5	25	75	--	N	3.65E+01	3.65E+00	N	1.02E+03	1.02E+02	N	7.82E+01	7.82E+00	--	--	--

Notes:
(a) Method Detection Limits and Reporting Limits provided by Empirical Laboratories, LLC
(b) USEPA Region 3 Risk-based Concentrations (October 2007)
(c) BTAG Screening Levels [1995 (soil), 2004 (surface water and sediment)].

Acronyms:
-- = Screening level unavailable.
BTAG = Biological Technical Assistance Group
CAS = Chemical Abstract Service
C!/N = RBC at HI of 0.1 < RBC-c; RBC from alternate RBC table.
C= RBC based cancer endpoint.
MCL = Maximum Contaminant Level
MDL = Method Detection Limit
mg/kg = Milligram Per kilogram
N = RBC based on non-carcinogenic endpoint.
PCBs = Polychlorinated Biphenyls
RBC = USEPA Region III Risk
RL = Reporting Limit
TCL = Target Compound List
ug/L = Microgram Per liter

Table 8-5
Summary of Analyte Detection Limits, Reporting Limits, and Risk Screening Levels for Explosives (Methods 8330, 8330M, and 8332)
Soil and Water Samples MQAP Addendum - PBC2
Radford Army Ammunition Plant,
Radford, Virginia

	CAS Number	Laboratory-Specific Method Detection and Reporting Limits (a)				USEPA MCLs	USEPA Region III Risk-Based Concentrations (b)									USEPA Region III BTAG Screening Levels (c)		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		mg/k	mg/kg	ug/L	ug/L	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/k	mg/kg
Compounds by Method 8330																		
1,3,5-Trinitrobenzene	99-35-4	0.1	0.5	0.1	0.5	NA	N	1.1E+03	1.1E+02	N	3.1E+04	3.1E+03	N	2.3E+03	2.3E+02	--	--	--
1,3-Dinitrobenzene	99-65-0	0.1	0.5	0.1	0.36	NA	N	3.7E+00	3.7E-01	N	1.0E+02	1.0E+01	N	7.8E+00	7.8E-01	--	--	--
2,4,6-Trinitrotoluene	118-96-7	0.1	0.5	0.1	0.5	NA	C/N	2.2E+00	1.8E+00	C!/N	9.5E+01	5.1E+01	C!/N	2.1E+01	3.9E+00	1.0E+02	--	9.2E-02
2,4-Dinitrotoluene	121-14-2	0.13	0.5	0.1	0.5	NA	N	7.3E+01	7.3E+00	N	2.0E+03	2.0E+02	N	1.6E+02	1.6E+01	4.4E+01	--	4.2E-02
2,6-Dinitrotoluene	606-20-2	0.13	0.5	0.1	0.5	NA	N	3.7E+01	3.7E+00	N	1.0E+03	1.0E+02	N	7.8E+01	7.8E+00	8.1E+01	--	--
2-Amino-4,6-dinitrotoluene	35572-78-2	0.15	0.5	0.1	0.5	NA	N	7.3E+01	7.3E+00	N	2.0E+03	2.0E+02	N	1.6E+02	1.6E+01	1.5E+03	--	--
2-Nitrotoluene	88-72-2	0.1	0.5	0.1	0.5	NA	N	6.1E+01	6.1E+00	N	1.0E+04	1.0E+03	N	7.8E+02	7.8E+01		--	--
3-Nitrotoluene	99-08-1	0.15	0.5	0.1	0.5	NA										7.5E+02	--	--
4-Amino-2,6-dinitrotoluene	1946-51-0	0.1	0.5	0.1	0.5	NA	N	7.3E+01	7.3E+00	N	2.0E+03	2.0E+02	N	1.6E+02	1.6E+01		--	--
4-Nitrotoluene	99-99-0	0.1	0.5	0.1	0.5	NA										1.9E+03	--	4.1E+00
HMX	2691-41-0	0.1	0.5	0.1	0.5	NA	N	1.8E+03	1.8E+02	N	5.1E+04	5.1E+03	N	3.9E+03	3.9E+02	1.5E+02	--	--
Nitrobenzene	98-95-3	0.11	0.5	0.1	0.33	NA	N	3.5E+00	3.5E-01	N	5.1E+02	5.1E+01	N	3.9E+01	3.9E+00		--	--
RDX	121-82-4	0.1	0.5	0.1	0.5	NA	C	6.1E-01	6.1E-01	C	2.6E+01	2.6E+01	C	5.8E+00	5.8E+00	3.6E+02	--	1.3E-02
Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	479-45-8	0.1	0.5	0.1	0.5	NA	N	1.5E+02	1.5E+01	N	4.1E+03	4.1E+02	N	3.1E+02	3.1E+01	--	--	--
PETN	78-11-5	1.6	5	1.3	5	NA	--	--	--	--	--	--	--	--	--	8.5E+04	--	--
Compound by Method 8332																		
Nitroglycerin	55-63-0	1.6	4.8	1.3	4.8	NA	N	3.7E+00	3.7E-01	N	1.0E+02	1.0E+01	N	7.8E+00	7.8E-01	1.4E+02	--	--

Notes:
(a) Method Detection Limits and Reporting Limits provided by Empirical Laboratories, LLC
(b) USEPA Region 3 Risk-based Concentrations (October 2007)
(c) BTAG Screening Levels [1995 (soil), 2004 (surface water and sediment)].

Acronyms:
-- = Screening level unavailable.
BTAG = Biological Technical Assistance Group
C!/N = RBC at HI of 0.1 < RBC-c; RBC from alternate RBC table.
C= RBC based cancer endpoint.
CAS = Chemical Abstract Service
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
MCL = Maximum Contaminant Level
MDL = Method Detection Limit
mg/kg = Milligram Per kilogram
N = RBC based on non-carcinogenic endpoint.
PCBs = Polychlorinated Biphenyls
RBC = USEPA Region III Risk
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine
RL = Reporting Limit
TCL = Target Compound List
ug/L = Microgram Per liter

Table 8-6
Summary of Analyte Detection Limits, Reporting Limits, and Risk Screening Levels for Dioxin/Furans (Mehtod 8290)
Soil and Water Samples PBC2 Project QAPP Addendum
Radford Army Ammnunition Plant,
Radford, Virginia

Dioxins and Furans by Method 8290	CAS Number	Laboratory-Specific Method Detection and Reporting Limits				USEPA MCLs	USEPA Region III Risk-Based Concentrations									USEPA Region III BTAG Screening Levels		
		Soil		Water			Tap Water			Soil Industrial			Soil Residential			Aqueous Fresh Water	Soil	Sediment
		MDL	Reporting Limit	MDL	Reporting Limit	MCL	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC	C/N	RBC	Adjusted RBC			
		ppt	ppt	ppq	ppq	ug/L		ug/L	ug/L		mg/kg	mg/kg		mg/kg	mg/kg	ug/L	mg/kg	mg/kg
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	0.0591	1	0.94	10	3.00E-05	C	4.46E-07	--	C	1.91E-05	--	C	4.26E-06	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	0.288	5	0.963	50	--	--		--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)[a]	39227-28-6	0.187	5	1.23	50	--	C	1.08E-05	--	C	4.62E-04	--	C	1.03E-04	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)[a]	57653-85-7	0.276	5	2.06	50	--	C	1.08E-05	--	C	4.62E-04	--	C	1.03E-04	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)[a]	19408-74-3	0.288	5	1.46	50	--	C	1.08E-05	--	C	4.62E-04	--	C	1.03E-04	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	0.293	5	3.46	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	0.644	10	1.03	100	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	51207-31-9	0.162	1	0.563	10	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	0.367	5	2.25	50	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	0.247	5	1.5	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	0.336	5	2.59	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	0.153	5	2.02	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	1.05	5	2.16	50	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	0.304	5	2.97	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	0.604	5	1.79	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	0.257	5	1.94	50	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	39001-02-0	0.694	10	2.52	100	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
CAS = Chemical Abstract Service
ppt = part per trillion
ppq = part per quadrillion
ug/L = Microgram Per liter
MDL = Method Detection Limit
RL = Reporting Limit
Method Detection Limits provided by SGS Environmental Services, Inc,
-- = No Risk Criteria Available

MCL = Maximum Contaminant Level
BTAG = Biological Technical Assistance Group
Soil - BTAG Screening Draft Values, 1995
Water - BTAG Freshwater Screening Values, 2004
Sediment - BTAG Sediment Screening Values, 2004
RBC = USEPA Region III Risk Based Concentration, Oct 2007
C/N = Carcinogenic /Noncarcinogenic
[a] = RBC value is for Hexachlorodibenzo-p-dioxin mix
[b] = Reporting limit was not low enough to meet screening criteria - but MDL does

Table 8-7
General Field Equipment and Calibration Procedures
Radford Army Ammunition Plant
Radford, Virginia

Instrument or Equipment	Description	Field Calibration Procedure	Performance Criteria	Responsible Personnel
pH/Conductivity, Temperature Meter	Meter designed for field use with battery operation. Range pH: 0 to 14 S.U. Range conductivity: 0 to 2,000 uS.	Instruments are factory-calibrated and automatically compensate for temperature. Calibration of the meters for pH will be completed each day immediately prior to use in accordance with ARCADIS SOPs T106 and/or T131 and the manufacturers recommendations. In general pH meter calibration will include two pH buffers bracketing expected pH range of samples to be measured (i.e. 7.00 and 4.00) with a verification of the slope using a third buffer (4.00 or 10.00) The electrode will be rinsed between buffers and stored in the manufacturer recommended solutions between field measurements. Conductivity calibrations are conducted similarly to the pH calibration utilizing two calibration standards and adjusting the meter to the appropriate values. Calibrations will be verified with a pH buffer at least every 4 hours and at the end of the sampling day.	pH +/- 0.01 S.U. Conductivity at +/- 2%FSD. The instrument will be checked with a pH buffer every 4 hours and at the end of the sampling day. If the response is greater than $\pm$ 0.2 S.U. from the standard, complete re-calibration will be conducted. Conductivity will be checked every 4 hours.	Sample Collection Personnel
pH/Conductivity, Temperature, Dissolved oxygen (DO), Oxidation/ Reduction (REDOX) Meter	YSI Model 600 XL probe with YSI Model 610-D display instrumentation or the QED FC4000. Units must automatically correct for salinity at low DO readings by estimating salinity from temperature and conductivity measurements, and then internally adjusting the DO reading. The probes must contain separate pH, temperature, conductivity, DO, and ORP probes in one unit.	Each day prior to use, the pH, specific conductance, DO, and ORP probes will be calibrated or tested for responsiveness in accordance with ARCADIS SOPs and the manufacturers recommendations. The pH probe will be calibrated utilizing two buffers (pH 7.00, then pH 4.00), and a verification buffer. The ORP probe is then calibrated with the ORP standard solution (Zobell), and the DO probe is checked with saturated air in accordance with manufacturers guidance The probes should be rinsed with deionized water between each calibration solution and following calibration. Used calibration solution is to be discarded. Finally, the conductivity probe is checked with a solution of known conductivity.	Turbidity and DO - +/- 10% pH +/- 0.01 S.U. Conductivity at +/- 2%FSD The instrument calibration will be verified every 4 hours and at the end of the sampling day. For pH, if the calibration check is greater than $\pm$ 0.2 S.U. from the true value, complete calibration will be conducted.	Project Geologist, Sample Collection Personnel

Table 8-7
General Field Equipment and Calibration Procedures
Radford Army Ammunition Plant
Radford, Virginia

Instrument or Equipment	Description	Field Calibration Procedure	Performance Criteria	Responsible Personnel
Turbidimeter	Nephelometer designed for field use with battery operation. Range 0.01 to 1000 NTU.	The unit is factory calibrated. Unit responsiveness will be checked prior to use each day with appropriate standards provided by the supplier. The responsiveness is checked on the 0 to 10 range, 0 to 100 range, and 0 to 1000 range.	+/- 10%	Sample Collection Personnel
HNU Photoionization Detector	Photoionization detector that is a portable, non-destructive trace gas analyzer. Units must be Class I, Division 2, Grade A,B,C,D. Unit must have rechargeable battery, range of 0 to 2000 ppm, and a 10.2 or 11.7 eV lamp. Calibration check gas (e.g., isobutylene must be provided with unit).	Instrument is calibrated internally prior to shipment from the warehouse or every 6 months, whichever is more frequent. In the field, HNUs will be calibrated at the start of each day in accordance with manufacturers instructions. If a significant change in weather occurs during the day (i.e., change in humidity or temperature) or if the unit is turned off for an extended period, the instrument will be recalibrated at prior to use. When an HNU is used to screen samples in the field, periodic ambient readings will also be recorded in the logbook. The general calibration procedure include: • Turn unit on and allow for five minute warm-up; • Set span control for probe being used (10.2 or 11.7); • Set function switch to standby position and adjust zero using zero adjust knob; • Set function switch to the 0 to 200 ppm range; • Connect the analyzer to the regulator and calibration gas cylinder • 0pen the regulator valve and allow the meter reading to stabilize; and • Using the span knob, adjust the meter to the concentration indicated on the calibration gas cylinder.	Meter must be able to adjust properly using the span knob or the lamp may require cleaning.	Site Safety Officer

Table 8-8
Field Quality Control Samples
Radford Army Ammunition Plant, Radford, Virginia

Control	Purpose of Sample	Collection Frequency
Field Duplicate	Ensure precision in sample homogeneity during collection and analysis	20% of field samples per matrix
Rinse Blank	Ensure the decontamination of sampling equipment has been adequately performed; to assess cross contamination and/or incidental contamination to the sample container	1 per 20 samples per matrix per sample technique
Temperature Blank	To verify sample cooler temperature upon receipt at the laboratory	1 per cooler
Trip Blank	To evaluate potential cross contamination of samples during transport or storage.	1 per cooler containing sample requiring VOC analyses

Table 8-9
Field Quality Control Elements Acceptance Criteria
Radford Army Ammunition Plant, Radford, Virginia

Item	DQO	Parameter	Frequency of Association	Criteria Goal
Field Duplicates	P, R	Organics	1 per 10 samples	RPD < 40% Aqueous; difference + RL* RPD < 60% Solid; difference + 2xRL*
Trip Blank	A,R	VOCs in water	1 per cooler with aqueous VOCs	No target analytes detected greater than the RL
Rinse Blank	A,R	Entire	1 per 20 samples per matrix per equipment type requiring decontamination	No target analytes detected greater than the RL
Chain of Custody Forms	R	Entire	Every sample	Filled out correctly to include signatures; no missing or incorrect information.
Representative Sampling Forms	R	Entire	Every sample	Filled out correctly to include signatures; no missing or incorrect information.
Field Logbook	R	Entire	Every sample	Filled out correctly to include analytical parameters; map file data; and applicable coding information.
Field Instrument Calibration Logs	A	Entire	Every measurement	Measurements must have associated calibration reference

A = Accuracy C = Comparability R = Representativeness P = Precision

Table 8-10
Analytical Quality Control Elements
Radford Army Ammunition Plant, Radford, Virginia

Item	DQO	Parameter	Frequency of Association	Criteria Requirement
Analytical Method	C	Entire	Each analysis	Method analyses based on USEPA methods as defined in Section 2.5
Chemical Data Packages	C	Entire	Each lot/batch	Pass peer review and formal QA/QC check.
Laboratory System Controls	A,C,P, R	Entire	During laboratory operations	No deficiencies
Holding Time	A,C,P, R	Entire	Each analysis	No deficiencies (Table 6-1)
Initial and Continuing Calibrations	A, P	Entire	As method applicable	Must meet method criteria and laboratory SOPs.
Method Blanks	A,R	Entire	Each lot/batch	No target analyte detected in the method blanks greater than RL
Laboratory Control Sample (LCS) and LSC Duplicate	A	Entire	Each lot/batch	Must meet criteria as defined in Tables 8-7 through 8-13
Matrix Spike MS, MS Duplicates, and Laboratory Replicates	A,P	Entire	Each lot/batch	Must meet criteria as defined in Tables 8-7 through 8-13
Surrogates	A	Entire	Organic fractions, including QC samples	Must meet criteria as defined in Tables 8-7 through 8-13
Serial dilution and Post Digestion Spike	A	Metals	Inorganic Fractions, Each lot/batch	Must meet criteria as defined in Table 8-10

Legend: A = Accuracy C = Comparability R = Representativeness P = Precision

Table 8-11
Quality Control Method Criteria for Volatile Organic Compounds by USEPA SW-846 8260B
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency	Acceptance Criteria		Corrective Action
Initial Calibration 5-pt curve (linear) 6-pt curve (2° order)	Set-up, major maintenance, or for drift correction	RRF > 0.10/0.30 for SPCCs RSD < 30% for CCCs response factors RSD for analytes < 15% or r>0.995 (linear) or r^2>0.99 (2° order)		Sample analysis cannot begin until this criterion is met. Data reviewer should review and judge each target compound against the acceptance criteria.
Initial Calibration Verification	Immediately following initial calibration	A second source full compliment target list with a percent recovery = 75-125%		Sample analysis cannot begin until this criterion is met.
Continuing Calibration Check	Every 12 hours	RRF > 0.10/0.30 for SPCCs %Difference for RF of CCCs ±30% from initial calibration. Mean for analytes < 20% as no individual target exceeds 40%D		Sample analysis cannot begin until this criterion is met. Data reviewer should review and judge each target compound against the acceptance criteria.
Method Blank	Every day/batch.	No target analytes greater than one half of the RL		Document source of contamination. Re-analysis is required for positive results associated with blank contamination.
Tuning BFB	Prior to calibration and every 12 hours	Must meet tuning criteria		Re-tune, re-calibrate, and re-analyze affected sample analyses.
Laboratory Control Spike	Every batch	Standards Full compliment target list	Laboratory generated control limits not to exceed recovery limits listed in the current version of the DOD QSM	Recoveries indicating a low bias require a re-extraction/reanalysis. Recoveries indicating a high bias require a re-extraction/re-analysis for associated positive field samples. Qualify associated data biased high or biased low as appropriate.
Internal Standards	Every sample	Recommended Standards fluorobenzene chlorobenzene-d5 1,4-dichlorobenzene-d4	Retention time ±30 seconds of mid point of initial calibration Area changes within a factor of two (-50% to +100%)	Inspect for malfunction. Demonstrate that system is functioning properly. Reanalyze samples associated with standards outside criteria. A third analytical run may be required at a dilution.

Table 8-11
Quality Control Method Criteria for Volatile Organic Compounds by USEPA SW-846 8260B
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency	Acceptance Criteria		Corrective Action
Surrogate	Every sample	Recommended Standards Toluene-d8 4-Bromofluorobenzene 1,2-Dichloroethane-d4	Laboratory generated control limits not to exceed those listed in the current version of the DOD QSM	If surrogate compounds do not meet criteria, there should be a re-analysis to confirm that the non-compliance is due to the sample matrix effects rather than laboratory deficiencies.
Matrix Spike and Duplicate	1 per 20 per matrix	Standards Full compliment target list	Laboratory generated control limits not to exceed recovery	If MS/MSD results do not meet criteria, the reviewer should review the data in

Table 8-12
Quality Control Method Criteria for Semi-volatile Organic Compounds by USEPA SW-846 8270C
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency	Acceptance Criteria		Corrective Action
Initial calibration 5-pt curve (linear) 6-pt curve (2° order)	Set-up, major maintenance, or for drift correction	RRF > 0.05 for SPCCs RSD <30% for CCC compounds RSD for target analytes < 15% or r>0.995 (linear) or r^2>0.99 (2° order)		Sample analysis cannot begin until this criterion is met. Data reviewer should review and judge each target compound against the acceptance criteria.
Initial Calibration Verification	Immediately following every initial calibration	A second source full compliment target list with a 80-120%		Sample analysis cannot begin until this criterion is met.
Continuing Calibration Check	12 hours	RRF > 0.05 for SPCCs %Difference for RF of CCCs ±30% from initial calibration Mean for analytes < 20% as no individual target exceeds 40%D		Sample analysis cannot begin until this criterion is met. Data reviewer should review and judge each target compound against the acceptance criteria.
Internal standards	Every sample	Retention time ±30 seconds from mid point of initial calibration Area changes by a factor of two (-50% to +100%)		Inspect for malfunction. Demonstrate that system is functioning properly. Reanalyze samples with internal standards outside criteria.
Tuning DFTPP	12 hours	Must meet tuning criteria.		Re-tune, re-calibrate, and re-analyze affected sample analyses.
Method Blank	Per extraction batch	No target analytes greater than one half of the RL		Document source of contamination. Re-extraction/re-analysis is required for positive results associated with blank contamination.
Laboratory Control Spike	Every batch	Standards Full compliment target list	Laboratory generated control limits not to exceed recovery limits listed in the current version of the DoD QSM	Recoveries indicating a low bias require a re-extraction/reanalysis. Recoveries indicating a high bias require a re-extraction/re-analysis for associated positive field samples. Qualify associated data biased high or biased low as appropriate.

Table 8-12
Quality Control Method Criteria for Semi-volatile Organic Compounds by USEPA SW-846 8270C
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency	Acceptance Criteria		Corrective Action
Internal Standards	Every sample	Recommended Standards phenanthrene-d10 chrysene-d12 perylene-d12 1,4-dichlorobenzene-d4 naphthalene-d8 acenaphthalene-d10	Retention time ±30 seconds of mid point of initial calibration Area changes within a factor of two (-50% to +100%)	Inspect for malfunction. Demonstrate that system is functioning properly. Reanalyze samples associated with standards outside criteria. A third analytical run may be required at a dilution.
Surrogate Spikes	Every sample	Recommended Standards nitrobenzene-d5 2-fluorobiphenyl p-terphenyl-d14 phenol-d5 2,4,6-tribromophenol 2-fluorophenol	Laboratory generated control limits not to exceed limits listed in the current version of the DoD QSM	If two base/neutral or acid surrogates are out of specification, or if one base/neutral or acid extractable surrogate has a recovery of less than 10%, then there should be a re-extraction and re-analysis to confirm that the non-compliance is due to sample matrix effects rather than laboratory deficiencies.
Matrix Spike and Duplicate	1 per 20 samples per matrix	Standards Full compliment target list	Laboratory generated control limits not to exceed recovery limits listed in the current version of the DoD QSM	If MS/MSD results do not meet criteria, the reviewer should review the data in conjunction with other QC results to identify whether the problem is specific to the QC samples or systematic.

Table 8-13
Quality Control Method Criteria for Explosives by USEPA SW-846 8330 and 8332
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Initial Calibration Curve 5-pt curve (linear) 6-pt curve (2° order)	Set-up, major maintenance, or for drift correction for each column used for analysis	%RSD <20% or r>0.995 (linear) or r2>0.99 (2o order)	Sample analysis cannot begin until this criterion is met.
Initial Calibration Verification	Immediately following every initial calibration	A second source full compliment of target list with recovery = 80-120%	Sample analysis cannot begin until this criterion is met.
Continuing Calibration Check	Every ten samples or twelve hours	%D ± 15% of the response factor from the initial curve. The mean may be used as long as no individual target exceeds 30%D	Sample analysis cannot begin until this criterion is met. If criteria are not met, reanalyze the daily standard. If the daily standard fails a second time, initial calibration must be repeated. Data reviewer should review and judge each target compound against the acceptance criteria.
Method Blank	1 per batch	No target analytes detected greater than one half of the RL	Document source of contamination. Re-extraction/re-analysis is required for positive results associated with blank contamination.

Table 8-13
Quality Control Method Criteria for Explosives by USEPA SW-846 8330 and 8332
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria		Corrective Action
Laboratory Control Spike	1 per batch	Standards Full compliment target list	Laboratory generated control limits not to exceed recovery limits listed in the current version of the DOD QSM	Recoveries indicating a low bias require a re-extraction/reanalysis. Recoveries indicating a high bias require a re-extraction/re-analysis for associated positive field samples. Qualify associated data biased high or biased low as appropriate.
Surrogate Spikes	Every sample	Standards A similar compound that is not expected to be found at the site	Laboratory generated control limits not to exceed limits listed in the current version of the DOD QSM	If surrogate compounds do not meet criteria, there should be a re-extraction and re-analysis to confirm that the non-compliance is due to the sample matrix effects rather than laboratory deficiencies.
Matrix Spike and Duplicate	1 per 20 samples per matrix	Standards Full compliment target list	Laboratory generated control limits not to exceed recovery limits listed in the current version of the DOD QSM	If MS/MSD results do not meet criteria, the reviewer should review the data in conjunction with other QC results to identify whether the problem is specific to the QC samples or systematic.

Table 8-13
Quality Control Method Criteria for Explosives by USEPA SW-846 8330 and 8332
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Target Analyte Confirmation	Every positive detection	RPD < 40%	Report the higher of the two concentrations unless a positive bias is apparent and qualify.

Table 8-14
Quality Control Method Criteria for Target Analyte List Metals by USEAP SW-846 6020/6010B/7471A/7470A/9010C/9012A
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria		Corrective Action
Tune (MS) [6020]	Daily	Analyzed a minimum of four times with RSD < 5% for analytes in the solution.		Sample analysis cannot begin until this criterion is met.
Mass Calibration (MS) [6020]	Daily	Difference < 0.1 amu from true value.		Adjust to the correct value.
Resolution Check (MS) [6020]	Daily	Peak width <0.9 amu at 10% peak height		Sample analysis cannot begin until this criterion is met.
Initial Calibration Curve (MS, ICP, Hg, & CN)	Daily, major maintenance, or to correct drift.	MS & ICP Option 1: 1-standard and a blank with a low level standard at RL.	Low level check standard + 20%.	The standards for that element must be re-prepared and re-analyzed again.
		MS & ICP Option 2: 3-standards and a blank	r > 0.995 for each element	
		Hg - 5-standards and a blank	r > 0.995	
		CN - 6 standards and a blank	r > 0.995	
Distilled Standards (CN)	Once per calibration	One high and one low distilled standard within + 10% of the true value		Sample analysis cannot begin until this criterion is met.

Table 8-14
Quality Control Method Criteria for Target Analyte List Metals by USEAP SW-846 6020/6010B/7471A/7470A/9010C/9012A
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Initial Calibration Verification (MS, ICP, Hg, & CN)		MS & ICP - A second source full compliment of target list with a percent recovery = 90-110%	Sample analysis cannot begin until this criterion is met.
	Immediately following initial calibration.	Hg - A second source full compliment of target list with a percent recovery = 80-120%	
		CN - A second source full compliment of target list with a percent recovery = 85-115%	
Initial Calibration Blank (MS, ICP, Hg, & CN)	Immediately following initial calibration verification.	No target analytes detected at concentration above 2 X MDL.	Sample analysis cannot proceed until this criterion is met.
Interference Check (MS & ICP)	Beginning of each sample analytical run.	Recovery ±20% of true value.	Terminate the analysis, correct the problem, re-calibrate, re-verify the calibration, and reanalyze associated samples.
Continuing Calibration Check (MS, ICP, Hg, & CN)	Every 10 samples and end of analytical run.	MS & ICP - Recovery ±10%.	Reanalyze; if the CCV fails again, stop analysis, the problem corrected, the instrument recalibrated, and the calibration re-verified prior to continuing sample analyses.
		Hg - Recovery ±20%.	
		CN - Recovery ±15%.	

Table 8-14
Quality Control Method Criteria for Target Analyte List Metals by USEAP SW-846 6020/6010B/7471A/7470A/9010C/9012A
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria		Corrective Action
Continuing Calibration Blank (MS, ICP, Hg, & CN)	Every 10 samples and end of analytical run.	No target analytes detected at concentration above 2 X MDL.		Sample sequence should not continue until this criterion is met. Demonstrate "clean". Affected samples will be reanalyzed.
Preparation Blank (MS, ICP, Hg, & CN)	1 per batch per matrix	No target analytes detected at concentration above one half of the RL.		Document source of contamination. Re-digestion/re-analysis is required for positive results associated with blank contamination, unless DQOs are still met.
Laboratory Control Sample (MS, ICP, Hg, & CN)	1 per batch per matrix	Standards Full compliment target list.	80-120% recovery Soil use generated limits	Recoveries indicating a low bias require a redigestion/ reanalysis. Recoveries indicating a high bias require a redigestion/ reanalysis for associated positive field samples. Qualify data biased high or biased low as appropriate.

Table 8-14
Quality Control Method Criteria for Target Analyte List Metals by USEAP SW-846 6020/6010B/7471A/7470A/9010C/9012A
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria		Corrective Action
Matrix Spike and Duplicate or Sample Duplicate (MS, ICP, Hg, & CN)	1 per 20 samples per matrix	Standards Full compliment target list.	75-125% recovery; ICP & Hg: RPD<25%; CN: RPD<20%; MS: [analyte]>100xIDL - RPD<20%; Soil use generated limits	Qualify associated data biased high or biased low as appropriate.
Post Digestion Spike (PDS) (MS & ICP)	1 per 20 samples per matrix	Standards Full compliment target list.	75-125% recovery	
Serial Dilution (MS & ICP)	1 per 20 samples per matrix	Used to assess new matrices	For sample results > 5x RL for ICP or > 20x RL for MS, %D between diluted and undiluted sample result <10%.	Chemical or physical interference indicated. Investigate to identify cause.
Internal Standards (MS)	Every Analytical Sequence	Standards & Blanks	80-120% of initial calibration intensity	Terminate the analysis, correct the problem, re-calibrate, re-verify the calibration, and reanalyze associated samples.
		Samples	30-120% of initial calibration intensity	Reanalyze at consecutive five fold dilutions until criteria is met.

Table 8-15
Quality Control Method Criteria for Pesticides, Herbicides, and PCBs by USEPA SW-846 8081A, 8082 and 8151A
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Initial calibration curve 5-pt curve (linear) 6-pt curve (2o order)	Set-up, major maintenance	%RSD<20% or r>0.995 (linear) or r2>0.99 (2o order)	Sample analysis cannot begin until this criterion is met.
Initial Calibration Verification	Immediately following every initial calibration	A second source full compliment of target list with a percent recovery = 85-115%	Sample analysis cannot begin until this criterion is met.
Continuing Calibration Check	Bracketing samples	%D recovery ± 15% of the response factor from the initial curve or mean with no individual peak >30%	Sample analysis cannot begin until this criterion is met. If criteria are not met, reanalyze the daily standard. If the daily standard fails a second time, initial calibration must be repeated. Data reviewer should review and judge each target compound against the acceptance criteria.
Endrin/4,4-DDT Breakdown	Bracketing samples	endrin degradation <15%. 4,4-DDT degradation <15%.	If criterion is not met, system must be deactivated and the affected samples reanalyzed.
Instrument Blank	After continuing calibration and highly contaminated samples.	No target analytes detected greater than one half the RL.	Demonstrate "clean". Affected samples will be reanalyzed.
Method Blank	Per extraction batch	No target analytes detected greater than one half the RL.	Document source of contamination. Re-extraction/re-analysis is required for positive results associated with blank contamination.

Table 8-15
Quality Control Method Criteria for Pesticides, Herbicides, and PCBs by USEPA SW-846 8081A, 8082 and 8151A
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria		Corrective Action
Laboratory Control Spike	Per extraction batch	Standards Full target list for 8081A and a mix of 1016 & 1260 for 8082	Laboratory generated control limits not to exceed limits listed in the current version of	Recoveries indicating a low bias require a re-extraction/reanalysis. Recoveries indicating a high bias require a re-extraction/re-analysis for associated positive field samples. Qualify associated data biased high or biased low as appropriate.
Surrogate Spikes	Every sample	Standards TCMX and DCB	Laboratory generated control limits not to exceed limits listed in the current version of DOD QSM	Investigate to assess cause, correct the problem, and document actions taken; re-extract and re-analyze sample. Specific method cleanups may be used to eliminate or minimize sample matrix effects. If still out, qualify.
Matrix Spike and Duplicate	1 per 20 samples per matrix	Standards Full target list for 8081A and a mix of 1016 & 1260 for 8082	Laboratory generated control limits	If MS/MSD results do not meet criteria, the reviewer should review the data in conjunction with other QC results to identify whether the problem is specific to
Target Analyte Confirmation	Every positive detection	RPD < 40%		Report the higher of the two concentrations unless a positive bias is apparent and qualify.

Table 8-16
Quality Control Method Criteria for Total Organic Carbon by Walkley-Black Method (Argonomy, Methods of Soil Analysis 29-3.5.2)
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Calibration (Titration Method)	Before Processing Samples a titration blank must be analyzed	0.5+/- 0.05N	If the titrant normality is not within the QC limit, clean the burette and remake the titrant solution and/or the 1N K2Cr2O7.
Laboratory Duplicate	1 per 20 samples or batch per matrix	RPD = 20%	If the RPD is out side the QC limit, it should be noted in the lab narrative.
Method Blank	1 per 20 samples or batch per matrix	No target analytes detected greater than the RL.	Document source of contamination. Re-extraction/re-analysis is required for positive results associated with blank contamination.
Laboratory Control Sample	1 per 20 samples per matrix	Laboratory generated control limits not to exceed recovery limits of 64-128%	Recoveries indicating a low bias require a re-extraction/reanalysis. Recoveries indicating a high bias require a re-extraction/re-analysis for associated positive field samples. Qualify associated data biased high or biased low as appropriate.
Matrix Spike and Duplicate	1 per 20 samples per batch, per matrix	Laboratory generated control limits not to exceed recovery limits of 68-142%	If MS/MSD results do not meet criteria, the reviewer should review the data in conjunction with other QC results to identify whether the problem is specific to the QC samples or systematic.

Table 8-17
Quality Control Method Criteria for General Chemistry Methods
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Initial calibration curve 5-pt curve	Major maintenance, instrument modification, per manufacturer's specifications	r>0.995 (linear) or r>0.99 (2° order)	Sample analysis cannot begin until this criterion is met.
Initial Calibration Verification	Immediately following every initial calibration	Recovery ±10% of true value	Sample analysis cannot begin until this criterion is met. If criteria are not met, reanalyze the daily standards. If the ICV fails a second time, initial calibration must be repeated.
Continuing Calibration Check	Every 10 samples, end of analytical run	Recovery ±10% of true value	Sample analysis cannot proceed until this criterion is met. Reanalyze CCC. If the CCC fails second time, the analysis must be terminated, the problem corrected, the instrument re-calibrated, and the calibration re-verified prior to continuing sample analyses.
Continuing Calibration Blank	Every 10 samples, end of analytical run	No target analytes detected greater than the RL.	If not within criteria, terminate the analysis, correct the problem, re-calibrate, and reanalyze each sample analyzed since the last acceptable CCB.

Table 8-17
Quality Control Method Criteria for General Chemistry Methods
Radford Army Ammunition Plant
Radford, Virginia

Procedure	Frequency of QC Procedure	Acceptance Criteria	Corrective Action
Method Blank	1 per 20 samples or batch per matrix	No target analytes detected greater than the RL.	Document source of contamination. Re-extraction/re-analysis is required for positive results associated with blank contamination.
Laboratory Control Sample	1 per 20 samples per matrix	Laboratory generated control limits not to exceed recovery limits of 75-125% or RPD of 30%	Recoveries indicating a low bias require a re-extraction/reanalysis. Recoveries indicating a high bias require a re-extraction/re-analysis for associated positive field samples. Qualify associated data biased high or biased low as appropriate.
Matrix Spike and Duplicate	1 per 20 samples per batch, per matrix	Laboratory generated control limits not to exceed recovery limits of 60-140% or RPD of 30%	If MS/MSD results do not meet criteria, the reviewer should review the data in conjunction with other QC results to identify whether the problem is specific to the QC samples or systematic.

Figures

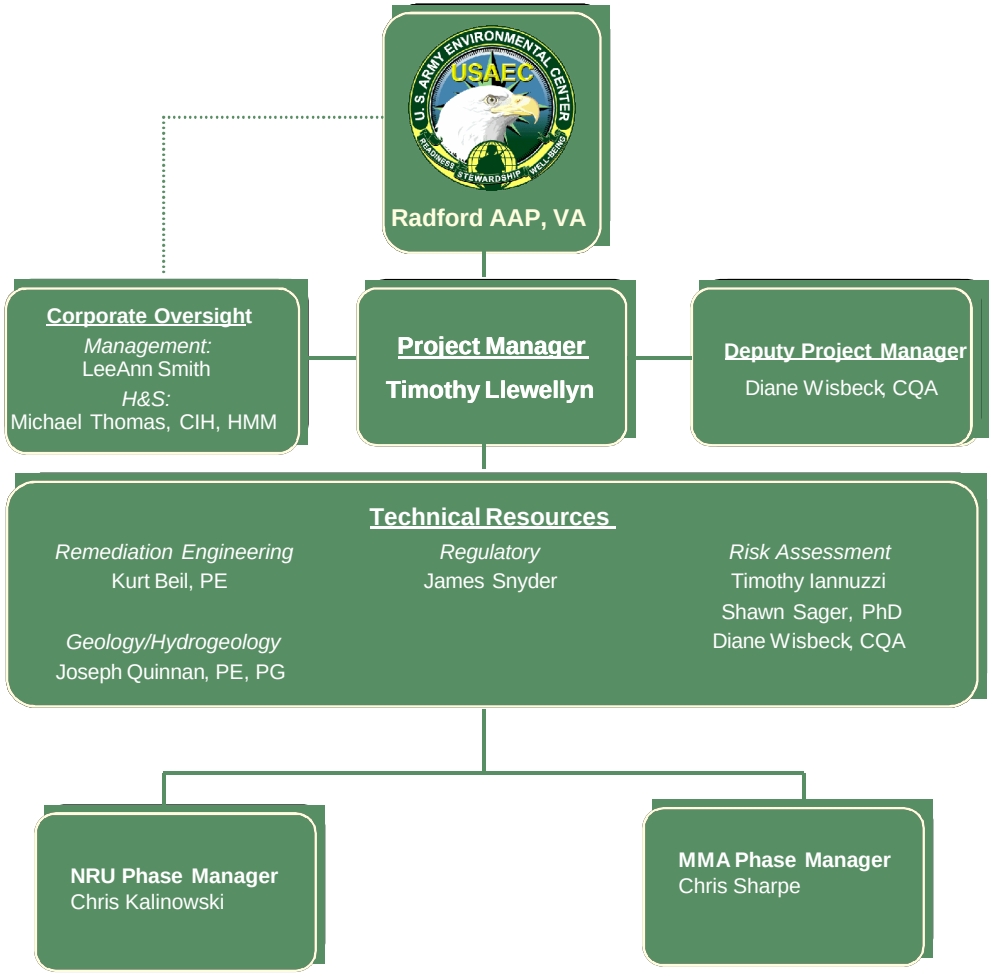


Figure 4-1
Project Organization Chart
Radford Army Ammunition Plant
Radford, Virginia

Appendix C

Technical Specifications

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems

ANSI Z87.1(1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection

ANSI Z88.2(1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1331(1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents

ASTM D 4397(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

ASTM E 119(1998) Fire Tests of Building Construction and Materials

ASTM E 1368(2005) Visual Inspection of Asbestos Abatement Projects

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

40 CFR 61 National Emissions Standards for Hazardous Air Pollutants (NESHAP)

40 CFR 763 Asbestos Hazard Emergency Response Act (AHERA)

42 CFR 84 Approval of Respiratory Protective Devices

49 CFR 107 Hazardous Materials Program Procedures

49 CFR 171 General Information, Regulations and Definitions

49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

49 CFR 173 Shippers - General Requirements for Shipments and Packaging

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7(1990) Compressed Air for Human Respiration

CGA G-7.1(1997) Commodity Specification for Air

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90-018(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance

EPA 340/1-90-019(1990) Asbestos/NESHAP Adequately Wet Guidance

EPA 560/5-85-024(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701(1996; TIA 96-1, 96-2) Methods of Fire Tests for Flame-Resistant Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Manual of Analytical Methods (NMAM®), 4th ed.
DHHS (NIOSH) Publication 94-113 (August, 1994),
1st Supplement Publication 96-135, 2nd Supplement Publication 98-119,
3rd Supplement 2003-154

UNDERWRITERS LABORATORIES (UL)

UL 586(1996) High-Efficiency, Particulate, Air Filter Units

COMMONWEALTH OF VIRGINIA

16 VAC 25-30-10 et seq. Virginia adoption of EPA Asbestos NESHAP regulations by reference

18 VAC 15-20-10 et seq. Virginia Department of Professional and Occupational Regulation (DPOR) Asbestos licensing requirements

1.2 DEFINITIONS

a. Adequately Wet: A term defined in 40 CFR 61, Subpart M, and EPA 340/1-90-019 meaning to sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.

b. Aggressive Method: Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).

c. Amended Water: Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter when tested in accordance with ASTM D 1331.

d. Asbestos: Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophylite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

e. Asbestos-Containing Material (ACM): Materials containing more than one percent asbestos.

f. Asbestos Fiber: A particulate form of asbestos, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.

g. Authorized Person: Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

h. Building Inspector: Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) "Building Inspector" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

i. Certified Industrial Hygienist (CIH): An Industrial Hygienist certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

j. Class I Asbestos Work: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

k. Class II Asbestos Work: Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos - containing wallboard, floor tile and sheeting, roofing and siding shingles,

and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glovebag may be classified as a Class III job.

l. Class III Asbestos Work: Activities defined by OSHA that involve repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

m. Class IV Asbestos Work: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean-up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists and cleaning up loose ACM debris from TSI or surfacing ACM following construction.

n. Clean room: An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

o. Competent Person: In addition to the definition in 29 CFR 1926, Section .32(f), a person who is capable of identifying existing asbestos hazards as defined in 29 CFR 1926, Section .1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

p. Contractor/Supervisor: Individual who supervises asbestos abatement work and has EPA. Model Accreditation Plan "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

q. Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.

r. Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

s. Demolition: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

t. Disposal Bag: A six-mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926, Section .1101, used for transporting asbestos waste from containment to disposal site.

u. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in 1 standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

v. Equipment Room or Area: An area adjacent to the regulated area used for the decontamination of employees and their equipment.

w. Employee Exposure: That exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

x. Fiber: A fibrous particulate, 5 micrometers or longer, with a length to width ratio of at least 3 to 1.

y. Friable ACM: A term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent, as determined by a method other than point counting by PLM, the asbestos content is verified by point counting using PLM.

z. Glovebag: Not more than a 60 by 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

aa. High-Efficiency Particulate Air (HEPA) Filter: A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

bb. Homogeneous Area: An area of surfacing material or thermal system insulation that is uniform in color and texture.

cc. Industrial Hygienist: A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

dd. Intact: ACM which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.

ee. Model Accreditation Plan (MAP): USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763, Subpart E, Appendix C.

ff. Modification: A changed or altered procedure, material or component of a control system,

which replaces a procedure, material or component of a required system.

gg. Negative Exposure Assessment: A demonstration by the Contractor to show that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).

hh. NESHAP: National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61, Subpart M.

ii. Nonfriable ACM: A NESHAP term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

jj. Nonfriable ACM (Category I): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

kk. Nonfriable ACM (Category II): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

ll. Permissible Exposure Limits (PELs):

(1) PEL-Time weighted average(TWA): Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8 hour time weighted average (TWA), as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

(2) PEL-Excursion Limit: An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

mm. Regulated Area: An OSHA term defined in 29 CFR 1926, Section .1101 meaning an area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted; also any adjoining area where debris and waste from such asbestos work accumulate; and an area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limit.

nn. Removal: All operations where ACM is taken out or stripped from structures or substrates, and includes demolition operations.

oo. Repair: Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM attached to structures or substrates. If the amount of asbestos so "disturbed" cannot be contained in 1 standard glovebag or waste bag, Class I precautions are required.

pp. Spills/Emergency Cleanups: Cleanup of sizable amounts of asbestos waste and debris which has occurred, for example, when water damage occurs in a building, and sizable amounts of ACM are dislodged. A Competent Person evaluates the site and ACM to be handled, and based on the type, condition and extent of the dislodged material, classifies the cleanup as Class I, II, or III. Only if the material was intact and the cleanup involves mere contact of ACM, rather than disturbance, could there be a Class IV classification.

qq. Surfacing ACM: Asbestos-containing material which contains more than 1% asbestos and is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

rr. Thermal system insulation (TSI) ACM: ACM which contains more than 1% asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain or water condensation.

ss. Transite: A generic name for asbestos cement ceiling and/or wallboard and pipe.

tt. Worker: Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926, Section .1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation required by 40 CFR 763, Subpart E, Appendix C, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

1.3 DESCRIPTION OF WORK

The work covered by this section includes the removal of deteriorated asbestos-containing materials (ACM) and adjacent surficial soils contaminated with asbestos fibers. It also includes procedures and equipment required to protect workers and occupants of the regulated area from contact with airborne asbestos fibers and ACM dust and debris. Activities may include OSHA Class II, Class III, and/or Class IV work operations involving ACM. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Contractor provided Accident Prevention Plan and its subcomponents, the Asbestos Hazard Abatement Plan and Activity Hazard Analyses

required in paragraph SAFETY AND HEALTH PROGRAM AND PLANS. These documents shall be provided by the Contractor as part of their proposal submittal for review and evaluation as part of the selection process.

There is no electrical or sewer servicing the project areas. In addition, there are only two yard hydrants that can be used to fill water tanker trucks.

1.3.1 Abatement Work Tasks

A. Removal of all asbestos-containing conductive flooring material from the remnants of seven former buildings at the BLA. Much of the conductive flooring material may be significantly weathered and deteriorated. Refer to Construction Drawings for actual buildings and locations.

B. Removal of all asbestos-containing conductive flooring material from the remnants of twenty-nine former buildings at the IAA. Much of the conductive flooring material may be significantly weathered and deteriorated. Refer to Construction Drawings for actual buildings and locations.

C. Excavation of surface soils immediately adjacent to the buildings with the asbestos-containing conductive flooring material at the BLA to meet the established cleanup goal of <0.1% asbestos by weight. The soil must also meet the established clean up goals for copper and lead, which are 11,533 mg/kg and 624 mg/kg, respectively.

D. Excavation of surface soils immediately adjacent to the buildings with the asbestos-containing conductive flooring material at the IAA to meet the established cleanup goal of <0.1% asbestos by weight. The soil must also meet the established clean up goals for copper, lead, and Aroclor 1254. The cleanup levels for these constituents are 3,043 mg/kg, 400 mg/kg, and 0.21 mg/kg, respectively.

E. Transportation and disposal of the flooring material, soils and associated wastes from the BLA and IAA at an approved off-site disposal facility. The Contractor will be responsible for coordinating transportation and disposal of the materials with Capitol Environmental, Inc. of Roanoke, Va. (contact Terri Fort: 540-777-6547).

F. Backfilling and restoration of the BLA and IAA sites.

1.3.2 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify ARCADIS, who will have the option of collecting bulk samples to be delivered to a laboratory accredited under the National Institute of

Standards and Technology (NIST) "National Voluntary Laboratory Accreditation Program (NVLAP)" and analyzed by PLM. Any additional components identified as ACM that have been approved by ARCADIS for removal shall be removed by the Contractor and will be paid for by an equitable adjustment to the contract price.

Sampling activities undertaken to determine the presence of additional ACM shall be conducted by personnel who have successfully completed the EPA Model Accreditation Plan (MAP) "Building Inspector" training course required by 40 CFR 763, Subpart E, Appendix C and appropriately licensed in the Commonwealth of Virginia.

1.4 SUBMITTALS

ARCADIS approval is required for the following submittals. The following shall be submitted in accordance with submittal procedures included elsewhere in the specifications.

1.4.1 Product Data [PRE-JOB]

Respiratory Protection Program [PRE-JOB]

- Records of the respirator program.

Cleanup and Disposal [DURING and POST-JOB]

- Waste shipment records.

Detailed Drawings [PRE-JOB]

- Descriptions, detail project drawings, and site layout to include worksite containment area techniques, local exhaust ventilation system locations, decontamination units and load-out units, other temporary waste storage facility, location of temporary utilities (e.g., electrical and water) and boundaries of each regulated area.

Materials and Equipment [PRE-JOB]

- Manufacturer's catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information. Test results and certificates from the manufacturer of encapsulants substantiating compliance with performance requirements of this specification. Material Safety Data Sheets (MSDS) for all chemicals to be used onsite in the same format as implemented in the Contractor's HAZARD COMMUNICATION PROGRAM.

- Data shall include, but shall not be limited to, the following items:

High Efficiency Filtered Air (HEPA) local exhaust equipment

1. Vacuum cleaning equipment
2. Pressure differential monitor for HEPA local exhaust equipment
3. Air monitoring equipment

Respirators

Personal protective clothing and equipment

1. Coveralls
2. Other work clothing
3. Foot coverings
4. Hard hats
5. Eye protection
6. Other items required and approved by Contractors Health and Safety Officer and Competent Person

Glovebags

Duct Tape

Disposal Containers

1. Disposal bags
2. Fiberboard drums
3. Paperboard boxes

Sheet Plastic

1. Polyethylene Sheet - General
2. Polyethylene Sheet - Flame Resistant
3. Polyethylene Sheet – Reinforced

Wetting Agents

1. Amended Water
2. Removal encapsulant

Prefabricated Decontamination Unit

Material Safety Data Sheets (for all chemicals proposed)

Other items

Qualifications [QUALIFICATIONS]

- A written report providing evidence of qualifications for personnel, facilities and equipment assigned to the work.

Training Program [PRE-JOB]

- A copy of the written project site-specific training material as indicated in 29 CFR 1926.1101 that will be used to train onsite employees. The training document shall be signed by the Contractor's Health and Safety Officer and Competent Person.

Medical Monitoring Requirements [PRE-JOB]

1. Physician's written opinion.
2. Respiratory fit testing records.

Encapsulants [PRE-JOB]

- Certificates stating that encapsulants meet the applicable specified performance requirements.

1.4.2 Test Reports [PRE-JOB and DURING]

Contractor Personnel Exposure Assessment and Air Monitoring

- Initial exposure assessments, negative exposure assessments, air-monitoring results and documentation.

Local Exhaust Ventilation

- Pressure differential recordings.

Licenses, Permits and Notifications [PRE-JOB]

- Contractor Virginia asbestos abatement contractor license
- USEPA NESHAP notification
- Commonwealth of Virginia NESHAP permit and notification

1.4.3 Certificates [PRE-JOB]

Vacuum, Filtration and Ventilation Equipment

- Manufacturer's certifications showing compliance with ANSI Z9.2 for:
  1. Vacuums.
  2. Water filtration equipment.

3. Ventilation equipment.
4. Other equipment required to contain airborne asbestos fibers.

1.5 QUALIFICATIONS SUBMITTALS [QUALIFICATIONS]

1.5.1 Written Qualifications and Organization Report

The Contractor shall furnish a written qualifications and organization report providing evidence of qualifications of the Contractor, Contractor's Project Supervisor, Designated Competent Person, supervisors and workers; Health and Safety Officer (person assigned to project); all subcontractors to be used including disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. The report shall include an organization chart showing the Contractor's staff organization for this project by name and title, chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor's: Project Manager, Designated Competent Person, Designated Health and Safety Officer; and the principals of all subcontractors to be used. The Contractor shall include the following statement in the report: "By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and the federal, state and local requirements specified in paragraph SAFETY AND HEALTH PROGRAM AND PLANS for those asbestos abatement activities that they will be involved in."

1.5.2 Specific Requirements

The Contractor shall designate in writing, personnel meeting the following qualifications:

a. Designated Competent Person: The name, address, telephone number, and resume of the Contractor's Designated Competent Person shall be provided. Evidence that the full-time Designated Competent Person is qualified in accordance with 29 CFR 1926, Sections .32 and .1101, has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and is experienced in the administration and supervision of asbestos abatement projects, including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite, etc. The duties of the Competent Person shall include the following: controlling entry to and exit from the regulated area; supervising any employee exposure monitoring required by 29 CFR 1926, Section .1101; ensuring that all employees working within a regulated area wear the appropriate personal protective equipment (PPE), are trained in the use of appropriate methods of exposure control, and use the hygiene facilities and decontamination procedures specified; and ensuring that engineering controls in use are in proper operating conditions and are functioning properly. The Designated Competent

Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan and Asbestos Hazard Abatement Plan. The Designated Competent Person shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that this person has a minimum of 7 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

b. Project and Other Supervisors: The Contractor shall provide the name, address, telephone number, and resume of the Project Supervisor and other supervisors who have responsibility to implement the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses, the authority to direct work performed under this contract and verify compliance, and have EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C. The Project Supervisor and other supervisors shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that the Project Supervisor has a minimum of 3 years of on-the-job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a minimum of 1 year on-the-job asbestos abatement experience commensurate with the responsibilities they will have on this project.

c. Designated Health and Safety Officer: The Contractor shall provide the name, address, telephone number, resume and other information specified below for the Health and Safety Officer selected to prepare the Contractor's Asbestos Hazard Abatement Plan, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Health and Safety Officer shall be a person who has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and has a minimum of 5 years of comprehensive experience in planning and overseeing asbestos abatement activities. The Health and Safety Officer shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Health and Safety Officer shall be available for emergencies. The formal reporting relationship between the Health and Safety Officer and the Designated Competent Person, and the Contractor shall be indicated.

d. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment" in this paragraph.

e. Worker Training and Certification of Worker Acknowledgment: Training documentation will be required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

f. First Aid and CPR Trained Persons: The names of at least 2 persons who are currently trained in first aid and CPR by the American Red Cross or other approved agency shall be designated and shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030 and shall be included in the Contractor's Bloodborne Pathogen Program. These persons may perform other duties but shall be immediately available to render first aid when needed. A copy of each designated person's current valid First Aid and CPR certificate shall be provided.

g. Personnel Exposure Monitoring Testing Laboratory: ARCADIS will provide the personnel exposure monitoring as required by OSHA regulations. ARCADIS will provide the air sampling solely at the direction of the Contractor's Competent Person. Therefore, the Contractor shall be responsible for directing ARCADIS when to conduct the sampling and for which tasks. The monitoring will use one of the following analytical procedures:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926, Section .1101, OSHA method ID-160, the most current version of NIOSH Pub No. 84-100 Method .7400, and NIOSH Pub No. 84-100 Method 7402, transmission electron microscopy (TEM); the laboratory is currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program; the names of the selected microscopists who will analyze airborne samples by PCM with verified documentation of their proficiency to conduct PCM analyses by being judged proficient in counting samples as current participating analysts in the AIHA PAT Program, and having successfully completed the Asbestos Sampling and Analysis course (NIOSH 582 or equivalent) with a copy of course completion certificate provided; when the PCM analysis is to be conducted onsite, documentation shall be provided certifying that the onsite analyst meets the same requirements.

(2) Transmission electron microscopy (TEM): The laboratory is fully equipped and proficient in conducting TEM analysis of airborne samples using the mandatory method specified by 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for airborne sample analysis of asbestos by TEM; the laboratory will use analysts that are currently evaluated as competent with demonstrated proficiency

under the NIST NVLAP for airborne sample analysis of asbestos by TEM and are proficient in conducting analysis for low asbestos concentration, enhanced analysis of floor tiles and bulk materials where multiple layers are present, using an improved EPA test method titled, "Method for the Determination of Asbestos in Bulk Building Materials".

(3) PCM/TEM: The laboratory is fully equipped and each analyst possesses demonstrated proficiency in conducting PCM and TEM analysis of airborne samples using NIOSH Pub No. 84-100Method 7400 PCM and NIOSH Pub No. 84-100 Method 7402 (TEM confirmation of asbestos content of PCM results) from the same filter.

h. Disposal Facility, Transporter: The Contractor shall coordinate with Capitol Environmental for the disposal of all generated asbestos-contaminated wastes in an EPA and Virginia-approved asbestos landfill. Capitol Environmental shall be responsible for the transportation and disposal of the Contractor's generated ACM waste. Capitol Environmental shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61, Section .150(b), and other applicable state or local requirements.

1.5.3 Federal, State or Local Citations on Previous Projects

The Contractor and all subcontractors shall submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company shall be provided.

1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. This includes, but is not limited to, OSHA standards, 29 CFR 1926, especially Section .1101, 40 CFR 61, Subpart M and 40 CFR 763. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.7 PRE-JOB SAFETY AND HEALTH PROGRAM AND PLANS SUBMITTALS

The Contractor shall develop and submit a written comprehensive site-specific Accident Prevention Plan as part of their proposal submission for review and evaluation as part of the selection process. The Accident Prevention Plan shall address requirements covering onsite work to be performed by the Contractor and subcontractors. The Accident Prevention Plan shall incorporate an Asbestos Hazard Abatement Plan, and Activity Hazard Analyses as separate appendices into one site specific Accident Prevention Plan document. Any portions of the Contractor's overall Safety and Health Program that are referenced in the Accident Prevention Plan, e.g., respirator program, hazard communication program, confined space entry program, etc., shall be included as appendices to the Accident Prevention Plan. The plan shall be prepared, signed and dated by the Contractor's Designated Health and Safety Officer, Competent Person, and Project Manager for this project.

1.7.1 Asbestos Hazard Abatement Plan Appendix

The Asbestos Hazard Abatement Plan Appendix to the Accident Prevention Plan shall include, but not be limited to, the following:

a. Descriptions, detail project drawings, and site layout to include worksite containment area techniques, local exhaust ventilation system locations, decontamination units and load-out units, other temporary waste storage facility, access tunnels, location of temporary utilities (electrical, water, sewer) and boundaries of each regulated area.

b. The personal protective equipment to be used;

c. The location and description of regulated areas including clean and dirty areas, access tunnels, and decontamination unit (clean room, shower room, equipment room, storage areas such as load-out unit);

d. Initial or negative exposure assessment in accordance with 29 CFR 1926, Section .1101;

e. Level of supervision;

f. Method of notification of other employers at the worksite;

g. Abatement method to include containment and control procedures;

h. Interface of trades involved in the construction;

i. Sequencing of asbestos related work;

j. Storage and disposal procedures and plan;

k. Type of wetting agent and asbestos encapsulant to be used;

l. Location of local exhaust equipment;

m. Air monitoring methods (personal – if required);

n. Bulk sampling and analytical methods (if required);

o. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations;

p. Fire and medical emergency response procedures;

q. The security procedures to be used for all regulated areas.

1.7.2 Activity Hazard Analyses Appendix

Activity Hazard Analyses, for each major phase of work, shall be submitted and updated during the project. The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity Hazard Analyses has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including pertinent onsite Contractor and ARCADIS representatives. The Activity Hazard Analyses shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

1.8 PRECONSTRUCTION CONFERENCE AND ONSITE SAFETY

The Contractor and the Contractor's Designated Competent Person, Project Supervisor, and Designated Health and Safety Officer shall meet with ARCADIS prior to beginning work at a safety preconstruction conference to discuss the details of the Contractor's submitted Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses appendices. Deficiencies in the Accident Prevention Plan will be discussed and the Accident Prevention Plan shall be revised to correct the deficiencies and resubmitted for acceptance. Any changes required in the specification as a result of the Accident Prevention Plan shall be identified specifically in the plan to allow for free discussion and acceptance by ARCADIS, prior to the start of work. Onsite work shall not begin until the Accident Prevention Plan has been accepted. A copy of the written Accident Prevention Plan shall be maintained onsite. Changes and modifications to the accepted Accident Prevention Plan shall be made with the knowledge and concurrence of the Designated Health and Safety Officer, the Project Supervisor, Designated Competent Person, and ARCADIS. Should any unforeseen hazard become evident during the

performance of the work, the Designated Health and Safety Officer shall bring such hazard to the attention of the Project Supervisor, Designated Competent Person, and ARCADIS, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Once accepted by ARCADIS, the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses will be enforced as if an addition to the contract. Disregarding the provisions of this contract or the accepted Accident Prevention Plan will be cause for stopping of work, at the discretion of ARCADIS, until the matter has been rectified.

1.9 SECURITY

A log book shall be kept documenting entry into and out of the regulated area. Entry into regulated areas shall only be by personnel authorized by the Contractor and ARCADIS. Personnel authorized to enter regulated areas shall be trained, be medically evaluated, and wear the required personal protective equipment for the specific regulated area to be entered.

1.10 MEDICAL REQUIREMENTS

Medical requirements shall conform to 29 CFR 1926, Section .1101.

1.10.1 Medical Examinations

Before being exposed to airborne asbestos fibers, workers shall be provided with a medical examination as required by 29 CFR 1926, Section .1101 and other pertinent state or local requirements. This requirement shall have been satisfied within the last 12 months. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. X-ray films of asbestos workers shall be identified to the consulting radiologist and medical record jackets shall be marked with the word "asbestos."

1.10.1.1 Information Provided to the Physician

The Contractor shall provide the following information in writing to the examining physician:

a. A copy of 29 CFR 1926, Section .1101 and Appendices D, E, G, and I;

b. A description of the affected employee's duties as they relate to the employee's exposure;

c. The employee's representative exposure level or anticipated exposure level;

d. A description of any personal protective and respiratory equipment used or to be used;

e. Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

1.10.1.2 Written Medical Opinion

For each worker, a written medical opinion prepared and signed by a licensed physician indicating the following:

a. Summary of the results of the examination.

b. The potential for an existing physiological condition that would place the employee at an increased risk of health impairment from exposure to asbestos.

c. The ability of the individual to wear personal protective equipment, including respirators, while performing strenuous work tasks under cold and/or heat stress conditions.

d. A statement that the employee has been informed of the results of the examination, provided with a copy of the results, informed of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure, and informed of any medical condition that may result from asbestos exposure.

1.10.2 Medical and Exposure Records

Complete and accurate records shall be maintained of each employee's medical examinations, medical records, and exposure data, as required by 29 CFR 1910, Section .1910.20 and 29 CFR 1926, Section .1101 for a period of 50 years after termination of employment. Records of the required medical examinations and exposure data shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health (OSHA) or authorized representatives of the employee and an employee's physician upon request of the employee or former employee. A copy of the required medical certification for each employee shall be maintained on file at the worksite for review, as requested by ARCADIS or the representatives.

1.11 TRAINING PROGRAM

1.11.1 General Training Requirements

The Contractor shall establish a training program as specified by EPA Model Accreditation Plan (MAP), training requirements at 40 CFR 763, Subpart E, Appendix C, Commonwealth of Virginia 18 VAC 15-20-10, OSHA requirements at 29 CFR 1926, Section .1101(k)(9), and this specification. Contractor employees shall complete the required training for the type of work they are to perform and such training shall be documented and provided to ARCADIS as specified in paragraph PRE-JOB QUALIFICATIONS.

1.11.2 Project Specific Training

Prior to commencement of work, each worker shall be instructed by the Contractor's Health and Safety Officer and Competent Person in the following project specific training:

a. The hazards and health effects of the specific types of ACM to be abated;

b. The content and requirements of the Contractor's Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses and site-specific safety and health precautions;

c. Hazard Communication Program;

d. Hands-on training for each asbestos abatement technique to be employed;

e. Heat and/or cold stress monitoring specific to this project;

f. Air monitoring program and procedures;

g. Medical surveillance to include medical and exposure record-keeping procedures;

h. The association of cigarette smoke and asbestos-related disease;

i. Security procedures;

j. Specific work practice controls and engineering controls required for each Class of work in accordance with 29 CFR 1926, Section .1101.

1.12 RESPIRATORY PROTECTION PROGRAM

The Contractor shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926, Section .1101, 29 CFR 1910, Section .134, and ANSI Z88.2. The Contractor shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations encountered during the performance of the asbestos abatement work. The Contractor's respiratory protection program shall include, but not be limited to, the following elements:

a. The company policy, used for the assignment of individual responsibility, accountability, and implementation of the respiratory protection program.

b. The standard operating procedures covering the selection and use of respirators. Respiratory selection shall be determined by the hazard to which the worker is exposed.

c. Medical evaluation of each user to verify that the worker may be assigned to an activity where respiratory protection is required.

d. Training in the proper use and limitations of respirators.

e. Respirator fit-testing, i.e., quantitative, qualitative and individual functional fit checks.

f. Regular cleaning and disinfection of respirators.

g. Routine inspection of respirators during cleaning and after each use when designated for emergency use.

h. Storage of respirators in convenient, clean, and sanitary locations.

i. Surveillance of regulated area conditions and degree of employee exposure (e.g., through air monitoring).

j. Regular evaluation of the continued effectiveness of the respiratory protection program.

k. Recognition and procedures for the resolution of special problems as they affect respirator use (e.g., no facial hair that comes between the respirator face piece and face or interferes with valve function; prescription eye wear usage; contact lenses usage; etc.).

l. Proper training in putting on and removing respirators.

1.12.1 Respiratory Fit Testing

A qualitative or quantitative fit test conforming to 29 CFR 1926, Section 1101, Appendix C shall be conducted by the Contractor's Health and Safety Officer for each Contractor worker required to wear a respirator, and for ARCADIS and authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test shall be performed for each worker wearing a negative-pressure respirator prior to initially wearing a respirator on this project and every 6 months thereafter. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, or of full-facepiece air purifying respirators where they are worn at levels at which half-facepiece air purifying respirators are permitted. If physical changes develop that will affect the fit, a new fit test for the worker shall be performed. Functional fit checks shall be performed by employees each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.12.2 Respirator Selection and Use Requirements

The Contractor shall provide respirators, and ensure that they are used as required by 29 CFR

1926, Section .1101 and in accordance with the manufacturer's recommendations. Respirators shall be approved by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. Personnel who handle ACM, enter regulated areas that require the wearing of a respirator, or who are otherwise carrying out abatement activities that require the wearing of a respirator, shall be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne asbestos concentration level to be encountered. For air-purifying respirators, the particulate filter portion of the cartridges or canister approved for use in airborne asbestos environments shall be high-efficiency particulate air (HEPA). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Health and Safety Officer based on the measured or anticipated airborne asbestos fiber concentrations to be encountered. Recommendations made by the Contractor's Health and Safety Officer to downgrade respirator type shall be submitted in writing to ARCADIS. The Contractor's Designated Competent Person in consultation with the Health and Safety Officer, shall have the authority to take immediate action to upgrade or downgrade respiratory type when there is an immediate danger to the health and safety of the wearer. Respirators shall be used in the following circumstances:

a. During all Class I asbestos jobs.

b. During all Class II work where the ACM is not removed in a substantially intact state.

c. During all Class II and III work which is not performed using wet methods. Respirators need not be worn during removal of ACM from sloped roofs when a negative exposure assessment has been made and ACM is removed in an intact state.

d. During all Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment.

e. During all Class III jobs where TSI or surfacing ACM is being disturbed.

f. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.

g. During all work where employees are exposed above the PEL-TWA or PEL-Excursion Limit.

h. In emergencies

1.12.3 Class I Work

The Contractor shall provide: (1) a tight-fitting, powered air purifying respirator equipped with high efficiency filters, or (2) a full-facepiece supplied air respirator operated in the pressure demand mode, equipped with HEPA egress cartridges, or (3) an auxiliary positive pressure

self-contained breathing apparatus, for all employees within the regulated area where Class I work is being performed; provided that a negative exposure assessment has not been produced, and that the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full-facepiece supplied air respirator, operated in the pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

1.12.4 Class II and III Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment; and Class III jobs where TSI or surfacing ACM is being disturbed.

1.12.5 Sanitation

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

1.13 HAZARD COMMUNICATION PROGRAM

A hazard communication program shall be established and implemented in accordance with 29 CFR 1926, Section .59. Material safety data sheets (MSDSs) shall be provided for all hazardous materials brought onto the worksite. One copy of the MSDSs shall be provided to ARCADIS and 1 copy shall be included in the Contractor's Hazard Communication Program.

1.14 LICENSES, PERMITS AND NOTIFICATIONS

1.14.1 General Legal Requirements

Necessary licenses, permits and notifications shall be obtained in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. The Contractor shall notify the Regional Office of the USEPA, and ARCADIS in writing, in accordance with regulatory requirements prior to the commencement of work, in accordance with 40 CFR 61, Subpart M, and state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notification shall be by Certified Mail, Return Receipt Requested. The Contractor shall furnish copies of the receipts to ARCADIS, in writing, prior to the commencement of work. For licenses, permits, and notifications that the Contractor is responsible for obtaining and shall pay any associated fees or other costs incurred.

1.14.2 Litigation and Notification

The Contractor shall notify ARCADIS if any of the following occur:

a. The Contractor or any of the subcontractors are served with notice of violation of any law, regulation, permit or license which relates to this contract;

b. Proceedings are commenced which could lead to revocation of related permits or licenses; permits, licenses or other US Army authorizations relating to this contract are revoked;

c. Litigation is commenced which would affect this contract;

d. The Contractor or any of the subcontractors become aware that their equipment or facilities are not in compliance or may fail to comply in the future with applicable laws or regulations.

1.15 PERSONAL PROTECTIVE EQUIPMENT

An adequate number of complete sets of personal protective equipment shall be made available to ARCADIS and authorized visitors for entry to the regulated area. ARCADIS and authorized visitors shall be provided with training equivalent to that provided to Contractor employees in the selection, fitting, and use of the required personal protective equipment and the site safety and health requirements. Contractor workers shall be provided with personal protective clothing and equipment and the Contractor shall ensure that it is worn properly. The Contractor's Health and Safety Officer and Designated Competent Person shall select and approve all the required personal protective clothing and equipment to be used.

1.15.1 Respirators

Respirators shall be in accordance with paragraph RESPIRATORY PROTECTION PROGRAM.

1.15.2 Whole Body Protection

Personnel exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn properly. The Contractor's Health and Safety Officer and Competent Person shall select and approve the whole body protection to be used. The Competent Person shall examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the work suit shall be immediately replaced. Disposable whole body protection shall be disposed of as asbestos contaminated waste upon exiting from the regulated area. Reusable whole body protection worn shall be either disposed of as asbestos contaminated waste upon exiting from the regulated area or be properly laundered in accordance with 29 CFR 1926, Section .1101. Whole body protection used for asbestos abatement shall not be removed from the worksite by a worker to be cleaned. Recommendations made by the Contractor's Health and

Safety Officer to downgrade whole body protection shall be submitted in writing to ARCADIS. The Contractor's Designated Competent Person, in consultation with the Health and Safety Officer, has the authority to take immediate action to upgrade or downgrade whole body protection when there is an immediate danger to the health and safety of the wearer.

1.15.2.1 Coveralls

Disposable coveralls with a zipper front shall be provided for all site-workers. Sleeves shall be secured at the wrists, and foot coverings secured at the ankles.

1.15.2.2 Work Clothing

An additional coverall shall be provided when the abatement and control method employed does not provide for the exit from the regulated area directly into an attached decontamination unit. Cloth work clothes for wear under the protective coverall, and foot coverings, shall be provided when work is being conducted in low temperature conditions. Cloth work clothes shall be either disposed of as asbestos contaminated waste or properly laundered in accordance with 29 CFR 1926, Section .1101.

1.15.2.3 Gloves

Gloves shall be provided to protect the hands. Where there is the potential for hand injuries (i.e., scrapes, punctures, cuts, etc.) a suitable glove shall be provided and used.

1.15.2.4 Foot Coverings

Cloth socks shall be provided and worn next to the skin. Footwear, as required by OSHA that is appropriate for safety and health hazards in the area shall be worn. Rubber boots shall be used in moist or wet areas. Reusable footwear removed from the regulated area shall be thoroughly decontaminated or disposed of as ACM waste. Disposable protective foot covering shall be disposed of as ACM waste. If rubber boots are not used, disposable foot covering shall be provided.

1.15.2.5 Head Covering

Hood type disposable head covering shall be provided. In addition, protective head gear (hard hats) shall be provided as required. Hard hats shall only be removed from the regulated area after being thoroughly decontaminated.

1.15.2.6 Protective Eye Wear

Eye protection provided shall be in accordance with ANSI Z87.1.

1.16 HYGIENE FACILITIES AND PRACTICES

The Contractor shall establish a decontamination area for the decontamination of employees, material and equipment. The Contractor shall ensure that employees enter and exit the regulated area through the decontamination area.

1.16.1 Shower Facilities

Shower facilities, when provided, shall comply with 29 CFR 1910, Section .141(d)(3).

1.16.2 3-Stage Decontamination Area

The decontamination unit shall have an equipment room and a clean room separated by a shower that complies with 29 CFR 1926.1101 and 1910.141 (unless the Contractor can demonstrate that such facilities are not feasible). Equipment and surfaces of containers filled with ACM shall be cleaned prior to removing them from the equipment room or area. Materials used for wet wiping shall be disposed of as asbestos contaminated waste. Hot water service will have to be provided by the Contractor. The Contractor shall provide a minimum 40-gallon electric water heater with minimum recovery rate of 20 gallons per hour and a temperature controller for each showerhead. Instantaneous type in-line water heater may be incorporated at each shower head in lieu of hot water heater, upon approval by ARCADIS. Flow and temperature controls shall be located within the shower and shall be adjustable by the user. The wastewater pump shall be sized for 1.25 times the showerhead flow-rate at a pressure head sufficient to satisfy the filter head loss and discharge line losses. The pump shall supply a minimum 2.5 gpm flow with 35 ft. of pressure head. Used shower water shall be collected and filtered to remove asbestos contamination. Filters and residue shall be disposed of as asbestos contaminated material. Filtered water shall be captured and disposed of as non-ACM waste. Wastewater filters shall be installed in series with the first stage pore size of 20 microns and the second stage pore size of 5 microns. The floor of the decontamination unit's clean room shall be kept dry and clean at all times. Water from the shower shall not be allowed to wet the floor in the clean room. Surfaces of the clean room and shower shall be wet-wiped 2 times after each shift change with a disinfectant solution. Proper housekeeping and hygiene requirements shall be maintained. Soap and towels shall be provided for showering, washing and drying. Any cloth towels provided shall be disposed of as ACM waste in accordance with 29 CFR 1926, Section .1101.

1.16.3 Load-Out Unit

A temporary load-out unit that is adjacent and connected to the regulated area shall be provided. Utilization of prefabricated units shall have prior approval of ARCADIS. The load-out unit shall be attached in a leak-tight manner to each regulated area. Surfaces of the load-out unit shall be adequately wet-wiped 2 times after each shift change. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.4 Single Stage Decontamination Area

A decontamination area (equipment room/area) shall be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment produced before the operation. The equipment room or area shall be adjacent to the regulated area for the decontamination of employees, material, and their equipment which is contaminated with asbestos. The equipment room or area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.5 Decontamination Requirements for Class IV Work

The Contractor shall ensure that employees performing Class IV work within a regulated area comply with the hygiene practice required of employees performing work which has a higher classification within that regulated area, or the Contractor shall provide alternate decontamination area facilities for employees cleaning up debris and material which is TSI or surfacing ACM.

1.16.6 Decontamination Area Entry Procedures

The Contractor shall ensure that employees entering the decontamination area through the clean room or clean area:

a. Remove street clothing in the clean room or clean area and deposit it in lockers.

b. Put on protective clothing and respiratory protection before leaving the clean room or clean area.

c. Pass through the equipment room to enter the regulated area.

1.16.7 Decontamination Area Exit Procedures

The Contractor shall ensure that the following procedures are followed:

a. Before leaving the regulated area, respirators shall be worn while employees remove all gross contamination and debris from their work clothing using a HEPA vacuum.

b. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal and/or laundering.

c. Employees shall not remove their respirators in the equipment room.

d. Employees shall shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, the Contractor shall ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

e. After showering, employees shall enter the clean room before changing into street clothes.

1.16.8 Break Areas

The Contractor shall provide break areas outside of the regulated areas in which the airborne concentrations of asbestos are below 0.01 f/cc.

1.16.9 Smoking

Smoking is not allowed anywhere at the project site. Contractor is not allowed to have any lighters, matches, open flame devices, etc. at the project site.

1.17 REGULATED AREAS

All Class I, II, and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they shall demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.18 WARNING SIGNS AND TAPE

Warning signs and tape printed bilingually in English and Spanish shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 20 by 14 inches, and displaying the following legend in the lower panel:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

Spacing between lines shall be at least equal to the height of the upper of any two lines. Warning tape shall be provided.

1.19 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1.20 LOCAL EXHAUST VENTILATION

Local exhaust ventilation units shall conform to ANSI Z9.2 and 29 CFR 1926, Section .1101. Filters on local exhaust system equipment shall conform to ANSI Z9.2 and UL 586. Filter shall be UL labeled.

1.21 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system, or has otherwise been approved for use by ARCADIS. Residual asbestos shall be removed from reusable tools prior to storage and reuse. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

1.22 RENTAL EQUIPMENT

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment. A written

acceptance of the terms of the Contractor's notification shall be obtained from the rental agency.

1.23 AIR MONITORING EQUIPMENT

ARCADIS shall approve air monitoring equipment to be used to collect samples. The equipment shall include, but shall not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute when equipped with a sampling train of tubing and filter cassette.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands, to be used with low flow pumps in accordance with 29 CFR 1926, Section .1101 for personal air sampling.

d. Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands, to be used with high flow pumps when conducting environmental area sampling using NIOSH Pub No. 84-100 Methods 7400 and 7402, (and the transmission electric microscopy method specified at 40 CFR 763 if required).

e. Appropriate plastic tubing to connect the air sampling pump to the selected filter cassette.

f. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

1.24 EXPENDABLE SUPPLIES

1.24.1 Glovebag

Glovebags shall be provided as described in 29 CFR 1926, Section .1101. The glovebag assembly shall be six-mil thick plastic, prefabricated and seamless at the bottom with preprinted OSHA asbestos warning label.

1.24.2 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container shall be provided.

1.24.3 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926 Section .1101.

1.24.4 Disposal Bags

Leak-tight bags, six-mil thick, shall be provided for placement of asbestos generated waste.

1.24.5 Sheet Plastic

Sheet plastic shall be polyethylene of six-mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams, as indicated on the project drawings. Film shall conform to ASTM D 4397, except as specified below.

1.24.5.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets shall be provided. Film shall conform to the requirements of NFPA 701.

1.24.5.2 Reinforced

Reinforced sheets shall be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

1.24.6 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

1.24.7 Mastic Removing Solvent

Mastic removing solvent shall be nonflammable and shall not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite shall have a flash point greater than 140 degrees F.

1.24.8 Viewing Inspection Window

Where feasible, a minimum of 1 clear, 1/8 inch thick, acrylic sheet, 18 by 24 inches, shall be

installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows shall be sealed leak-tight with industrial grade duct tape.

1.24.9 Wetting Agents

Removal encapsulant (a penetrating encapsulant) shall be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant shall be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS.

1.25 MISCELLANEOUS ITEMS

A sufficient quantity of other items, such as, but not limited to: scrapers, brushes, brooms, staple guns, tarpaulins, shovels, rubber squeegees, dust pans, other tools, scaffolding, staging, enclosed chutes, wooden ladders, lumber necessary for the construction of containments, UL approved temporary electrical equipment, material and cords, ground fault circuit interrupters, water hoses of sufficient length, fire extinguishers, first aid kits, portable toilets, logbooks, log forms, markers with indelible ink, spray paint in bright color to mark areas, project boundary fencing, etc., shall be provided as needed.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Encapsulants shall conform to USEPA requirements, shall contain no toxic or hazardous substances and no solvent and shall meet the following requirements:

ALL ENCAPSULANTS

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Combustion Toxicity Zero Mortality	Univ. of Pittsburgh Protocol
Life Expectancy, 20 yrs Accelerated Aging Test	ASTM C 732
Permeability, Minimum 0.4 perms	ASTM E 96

Additional Requirements for Bridging Encapsulant

Requirement	Test Standard
Cohesion/Adhesion Test, 50 pounds of force/foot	ASTM E 736
Fire Resistance, Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E 119
Impact Resistance, Minimum 43 in-lb (Gardner Impact Test)	ASTM D 2794
Flexibility, no rupture or cracking (Mandrel Bend Test)	ASTM D 522

Additional Requirements for Penetrating Encapsulant

Requirement	Test Standard
Cohesion/Adhesion Test, 50 pounds of force/foot	ASTM E 736
Fire Resistance, Negligible affect on fire resistance rating over 3 hour test(Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E 119
Impact Resistance, Minimum 43 in-lb (Gardner Impact Test)	ASTM D 2794
Flexibility, no rupture or cracking (Mandrel Bend Test)	ASTM D 522

Additional Requirements for Lockdown Encapsulant

Requirement	Test Standard
Fire Resistance, Negligible affect on fire resistance rating over 3 hour test(Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E 119
Bond Strength, 100 pounds of force/foot (Tests	ASTM E 736

compatibility with cementitious
and fibrous fireproofing)

TINTED – In a color and opacity that facilitates the determination that adequate spray coverage is attained.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Asbestos abatement work tasks shall be performed as detailed in the Contractor's Accident Prevention Plan, Asbestos Hazard Abatement Plan, and the Activity Hazard Analyses as approved by ARCADIS.

The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize protective clothing and equipment as specified. The Contractor shall not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. All hot work (burning, cutting, welding, etc.) shall be conducted under controlled conditions in conformance with 29 CFR 1926, Section .352, Fire Prevention. Personnel of other trades, not engaged in asbestos abatement activities, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the Contractor's Accident Prevention Plan are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal.

The Contractor shall stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) inside regulated work area ambient air concentrations equals or exceeds 1.0 f/cc. The Contractor shall correct the condition to the satisfaction of ARCADIS, including visual inspection and air sampling. Work shall resume only upon notification by ARCADIS. Corrective actions shall be documented.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or areas. Where such work or area is damaged or contaminated, as verified by ARCADIS using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to ARCADIS, as deemed appropriate by ARCADIS. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Health and Safety Officer and ARCADIS,

work shall proceed.

3.3 OBJECTS

3.3.1 Mobile Objects

Mobile objects, furniture and equipment shall be removed from the abatement work areas for either decontamination or removal and disposal as asbestos contaminated waste.

3.3.2 Stationary Objects

Stationary objects and equipment shall remain in place and shall be either be decontaminated or removed and disposed of as asbestos-contaminated waste.

3.4 CRITICAL BARRIERS

Air-tight critical barriers shall be installed on building openings to the outside or between work areas and non-work areas inside the building. The critical barriers shall consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces shall be sealed with industrial grade duct tape.

3.5 PRECLEANING

Pre-cleaning of surfaces is not necessary for this project as flooring surfaces are considered to be contaminated with deteriorated flooring material containing asbestos.

3.6 METHODS OF COMPLIANCE

3.6.1 Mandated Practices

The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M, and the specified requirements. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including, but not limited to, details of construction materials, equipment, and handling procedures. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters to collect debris and dust containing ACM.

b. Wet methods or wetting agents to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup; except where it can be demonstrated that the use of wet methods is unfeasible due to, for example, the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposal in leak-tight containers of wastes and debris contaminated with asbestos.

d. Inspection and repair of polyethylene in work and high traffic areas.

e. Cleaning of equipment and surfaces of containers filled with ACM prior to removing them from the equipment room or area.

3.6.2 Control Methods

The Contractor shall use the following control methods to comply with the PELs:

a. Local exhaust ventilation equipped with HEPA filter dust collection systems;

b. Enclosure or isolation of processes producing asbestos dust;

c. Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;

d. Use of other ARCADIS-approved work practices and engineering controls;

e. Where the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the PELs, the Contractor shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with paragraph, RESPIRATORY PROTECTION PROGRAM.

3.6.3 Unacceptable Practices

The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean-up of dust and debris containing ACM.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.6.4 Class I Work Procedures

In addition to requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used for Class I work activities:

a. A Competent Person shall supervise the installation and operation of the control system.

b. For jobs involving the removal of more than 25 linear feet or 10 square feet of TSI or surfacing material, the Contractor shall place critical barriers over all openings to the regulated area.

c. HVAC systems shall be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.

d. Impermeable dropcloths (six-mil or greater thickness) shall be placed on surfaces beneath all removal activity.

e. Objects within the regulated area shall be handled as specified in paragraph OBJECTS.

f. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area shall be ventilated to move contaminated air away from the employee's breathing zone toward a HEPA unit or collection device.

3.6.5 Specific Control Methods for Class I Work

In addition to requirements of paragraph Class I Work Procedures, Class I asbestos work shall be performed using the control methods identified in the subparagraphs below.

3.6.5.1 Negative Pressure Enclosure (NPE) System

The system shall provide at least 4 air changes per hour inside the containment. The local exhaust unit equipment shall be operated 24 hours per day until the containment is removed, and shall be leak-proof to the filter and equipped with HEPA filters. Air movement shall be directed away from the employees and toward a HEPA filtration device. The NPE shall be smoke tested for leaks at the beginning of each shift. Local exhaust equipment shall be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Pressure differential shall be monitored continuously, 24 hours per day, with an automatic manometric recording instrument. Pressure differential recordings shall be provided daily on the same day collected. Readings shall be reviewed by the Contractor's Designated Competent Person prior to submittal. ARCADIS shall be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system shall not be used as the local exhaust system for the regulated area. The local exhaust system shall terminate outdoors unless

an alternate arrangement is allowed by ARCADIS. All filters used shall be new at the beginning of the project and shall be periodically changed as necessary and disposed of as ACM waste.

3.6.5.2 Mini-Enclosures

Mini-containment accommodate no more than 2 persons, may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices. The mini-enclosure shall be inspected for leaks and smoke tested before each use. Air movement shall be directed away from the employee's breathing zone within the mini-enclosure.

3.6.6 Class II Work

In addition to the requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the work.

b. For indoor work, critical barriers shall be placed over all openings to the regulated area.

c. Impermeable dropcloths shall be placed on surfaces beneath all removal activity.

d. For outdoor work (on concrete pads/slabs), or buildings that are not completely enclosed, the Contractor shall construct temporary enclosure barriers to completely isolate the abatement work area from the surrounding environment. This may include erecting supporting structures such as scaffolding and/or framing. If wood framing is used, it shall be pressure treated for outdoor use.

3.6.7 Other Class II Jobs

The Contractor shall use the following work practices when performing Class II removal of ACM: The material shall be thoroughly wetted with amended water prior and during its removal. The material shall be removed in an intact state. Cutting, abrading or breaking the material is prohibited. The ACM removed shall be immediately bagged or wrapped.

3.6.8 Specific Control Methods for Class III Work

Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees. The work shall be performed using wet methods and, to the extent feasible, using local exhaust ventilation. The Contractor shall use impermeable dropcloths and shall isolate the operation, using mini-enclosures or glovebag systems, where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of TSI or surfacing material.

3.6.9 Specific Control Methods for Class IV Work

Class IV jobs shall be conducted using wet methods, HEPA vacuums, and prompt clean-up of debris containing ACM. Employees cleaning up debris and waste in a regulated area where respirators are required shall wear the selected respirators.

3.6.10 Cleaning After Asbestos Removal

After completion of all asbestos removal work, surfaces from which ACM has been removed shall be wet wiped or sponged clean, or cleaned by some equivalent method to remove all visible residue. Run-off water shall be collected and filtered through a filtration system. A final filter must be provided that removes fibers 5 micrometers and larger. After the gross amounts of asbestos have been removed from every surface, remaining visible accumulations of asbestos on floors shall be collected using plastic shovels, rubber squeegees, rubber dustpans, and HEPA vacuum cleaners as appropriate to maintain the integrity of the regulated area. Surfaces or locations which could harbor accumulations or residual asbestos dust shall be checked after vacuuming to verify that no asbestos-containing material remains; and shall be re-vacuumed as necessary to remove the ACM.

3.7 FINAL CLEANING AND VISUAL INSPECTION

Upon completion of abatement, the regulated area shall be cleaned by collecting, packing, and storing all gross contamination. A final cleaning shall be performed using HEPA vacuum and wet cleaning of all exposed surfaces and objects in the regulated area. Upon completion of the cleaning, the Contractor shall conduct a visual pre-inspection of the cleaned area in preparation for a final inspection before final air clearance monitoring and recleaning, as necessary. Upon completion of the final cleaning, the Contractor and ARCADIS shall conduct a final visual inspection of the cleaned regulated area in general accordance with ASTM E 1368 and document the results. If ARCADIS rejects the clean regulated area as not meeting final cleaning requirements, the Contractor shall reclean as necessary and have a follow-on inspection conducted with ARCADIS. All recleaning and follow-up reinspections shall be at the Contractor's expense and not considered compensable by ARCADIS.

3.8 LOCKDOWN

Prior to removal of plastic barriers and after clean-up of gross contamination and final visual inspection, a post removal (lockdown) encapsulant shall be spray applied to ceiling, walls, floors, and other surfaces in the regulated area. The encapsulant shall be of a readily observable color to facilitate easy identification of adequate coverage on sprayed surfaces.

3.9 PERSONNEL EXPOSURE ASSESSMENT AND AIR MONITORING

3.9.1 General Requirements for Personnel Exposure Monitoring

Personnel exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed by ARCADIS, at the direction of the Contractor's Competent Person, in accordance with 29 CFR 1926, Section .1101, and as specified. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. ARCADIS will employ qualified analysts and appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926.1101, to include NIOSH Pub No. 84-100 Method 7400.

Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be determined by the Contractor's Competent Person. The Competent Person will then direct ARCADIS as to which employees and work activities to conduct the personal exposure monitoring so that they are in compliance with the OSHA standard.

Pre-abatement, during abatement environmental air monitoring, and final clearance air sampling shall be performed by ARCADIS. Environmental and final clearance air monitoring shall be performed using NIOSH Pub No. 84-100 Method 7400 (PCM) with optional confirmation of results by NIOSH Pub No. 84-100 Method 7402 (TEM). For environmental and final clearance, air monitoring shall be conducted at a sufficient velocity and duration to establish optimum fiber loading on the cassette. Confirmation of asbestos fiber concentrations (asbestos f/cc) from environmental and final clearance samples collected and analyzed by NIOSH Pub No. 84-100 Method 7400 (total f/cc) may be conducted using TEM in accordance with NIOSH Pub No. 84-100 Method 7402. When such confirmation is conducted, it shall be from the same sample filter used for the NIOSH Pub No. 84-100 Method 7400 PCM analysis.

Personnel exposure monitoring may be duplicated by the Contractor at their own cost. Results of breathing zone samples shall be posted at the job site and made available to Contractor and ARCADIS. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with ARCADIS to determine the cause. At the discretion of ARCADIS, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify ARCADIS, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by ARCADIS.

3.9.2 Initial Exposure Assessment

The Contractor's Health and Safety Officer shall conduct an exposure assessment immediately

before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation. The assessment shall be completed in time to comply with the requirements which are triggered by exposure data or the lack of a negative exposure assessment, and to provide information necessary to assure that all control systems planned are appropriate for that operation. The assessment shall take into consideration the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the Contractor which indicate the levels of airborne asbestos likely to be encountered on the job. For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of PELs, or otherwise makes a negative exposure assessment, the Contractor shall presume that employees are exposed in excess of the PEL-TWA and PEL-Excursion Limit.

3.9.3 Negative Exposure Assessment

The Contractor shall provide a negative exposure assessment for the specific asbestos job which will be performed. The negative exposure assessment shall be provided within five days of the initiation of the project and conform to the following criteria:

a. Objective Data: Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the PEL-TWA and PEL-Excursion Limit under those work conditions having the greatest potential for releasing asbestos.

b. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-Excursion Limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations; the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job; and these data show that under the conditions prevailing and which will prevail in the current workplace, there is a high degree of certainty that the monitoring covered exposure from employee exposures will not exceed the PEL-TWA and PEL-Excursion Limit.

c. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job, made from breathing zone air samples that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee. The monitoring covered exposure from operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

3.9.4 Independent Environmental Monitoring

The US Army has retained ARCADIS to be the independent air monitoring firm to perform pre-abatement, during abatement, and final clearance air monitoring. The abatement contractor will coordinate all onsite activities with ARCADIS, and other affected parties as directed by ARCADIS. The abatement contractor will provide ARCADIS with an up-to-date schedule of abatement contractor work activities. The abatement contractor is responsible for coordinating with ARCADIS to perform the exposure assessment and personal air monitoring of the abatement Contractor's work.

3.9.5 Pre-abatement Environmental Air Monitoring

Pre-abatement environmental air monitoring may be established prior to the masking and sealing operations for each regulated area to determine background concentrations before abatement work begins. As a minimum, pre-abatement air samples shall be collected using NIOSH Pub No. 84-100 Method 7400, PCM at these locations: outside the building; inside the building, but outside the regulated area perimeter; and inside each regulated work area. The PCM samples shall be analyzed within 24 hours; and if any result in fiber concentration greater than 0.01 f/cc, asbestos fiber concentration may be confirmed using NIOSH Pub No. 84-100 Method 7402 (TEM).

3.9.6 Environmental Air Monitoring During Abatement

Until an exposure assessment is conducted or provided, environmental air monitoring shall be conducted at locations and frequencies that will accurately characterize any evolving airborne asbestos fiber concentrations. The assessment shall demonstrate that the product or material containing asbestos minerals, or the abatement involving such product or material, cannot release airborne asbestos fibers in concentrations exceeding 0.01 f/cc under those work conditions having the greatest potential for releasing asbestos. The monitoring shall be at least once per shift at locations including, but not limited to, downwind and upwind locations for soil excavation areas; close to the work inside a regulated area; pre-abatement sampling locations; outside entrances to a regulated area; close to glovebag operations; representative locations outside of the perimeter of a regulated area; inside clean room; and at the exhaust discharge point of local exhaust system ducted to the outside of a containment (if used).

If the sampling outside regulated area shows airborne fiber levels have exceeded background or 0.01 f/cc, whichever is greater, work shall be stopped immediately, and ARCADIS will notify the Contractor. The condition causing the increase shall be corrected. Work shall not restart until authorized by ARCADIS.

3.9.7 Final Clearance Air Monitoring

Prior to conducting final clearance air monitoring, the Contractor and ARCADIS shall conduct a final visual inspection in general accordance with ASTM E1368 of the regulated area where asbestos abatement has been completed. Final clearance air monitoring shall not begin until

acceptance of the Contractor's final cleaning by ARCADIS. ARCADIS will conduct final clearance air monitoring using non-aggressive air sampling techniques. The initial clearance air sampling and analytical method used will be NIOSH Pub No. 84-100Method 7400 (PCM).

3.9.7.1 Number of Final Clearance Air Samples

3.9.7.1.1 ACM Flooring Removal Work Areas

The total number of final clearance air samples to be collected from each work area will be dependent upon the size and configuration of the work area, and determined by the professional judgment of ARCADIS.

3.9.7.1.2 Soil Excavation Work Areas

The total number of final clearance air samples and locations to be collected from each soil excavation work area will be dependent upon the size and configuration of the work area, as well as environmental factors such as wind speed and direction, and determined by the professional judgment of ARCADIS.

3.9.7.2 Final Clearance Requirements, NIOSH PCM Method

For PCM sampling and analysis using NIOSH Pub No. 84-100 Method 7400, the fiber concentration inside the abated regulated area, for each airborne sample, shall be less than 0.01 f/cc. The abatement inside the regulated area is considered complete when every PCM final clearance sample is below the clearance limit. If any sample result is greater than 0.01 total f/cc, abatement is incomplete and cleaning shall be repeated. Upon completion of any required re-cleaning, re-sampling with results to meet the above clearance criteria shall be done.

3.9.7.3 Final Clearance Requirements, EPA AHERA TEM Method (If applicable)

If determined to be applicable by ARCADIS, EPA TEM sampling and analysis will be performed using the EPA Method specified in 40 CFR 763, abatement inside the regulated area is considered complete when the arithmetic mean asbestos concentration of the 5 inside samples is less than or equal to 70 structures per square millimeter (70 S/mm). When the arithmetic mean is greater than 70 S/mm, the 3 blank samples shall be analyzed. If the 3 blank samples are greater than 70 S/mm, re-sampling shall be done. If less than 70 S/mm, the 5 outside samples shall be analyzed and a Z-test analysis performed. When the Z-test results are less than 1.65, the decontamination shall be considered complete. If the Z-test results are more than 1.65, the abatement is incomplete and cleaning shall be repeated. Upon completion of any required re-cleaning, re-sampling with results to meet the above clearance criteria shall be done.

3.9.7.3 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, the Contractor shall pay all costs associated with the required re-cleaning, re-sampling, and analysis, until final clearance requirements are met.

3.9.8 Air-Monitoring Results and Documentation

Air sample fiber counting shall be completed and results provided within 24 hours (breathing zone samples), and 48 hours (environmental/clearance monitoring) after completion of a sampling period. ARCADIS shall notify the Contractor and other affected parties immediately of any airborne levels of asbestos fibers in excess of established requirements. The written results shall be signed by testing laboratory analyst and testing laboratory principal. Air sampling results shall be documented on ARCADIS's daily air monitoring log. The daily air monitoring log shall contain the following information for each sample:

a. Sampling and analytical method used;

b. Date sample collected;

c. Sample number;

d. Sample type: BZ = Breathing Zone (Personal), P = Pre-abatement, E = Environmental, FC = Final Clearance;

e. Location/activity/name where sample collected;

f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (L/min);

g. Calibration date, time, method, location, name of calibrator, signature;

h. Sample period (start time, stop time, elapsed time (minutes);

i. Total air volume sampled (liters);

j. Sample results in f/cc for PCM or S/mm^2 if confirmatory TEM methods are required for final clearance;

k. Laboratory name, location, analytical method, analyst, confidence level. In addition, the printed name and a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log.

3.10 SOIL EXCAVATION WORK AREA CLEARANCE AND RELEASE CRITERIA

In addition to meeting the final clearance air sampling criteria of <0.01 f/cc, each soil excavation work area will also be required to meet the following soil testing criteria:

3.10.1 Final Clearance Soil Testing Criteria

Subsequent to the Contractor completing the excavation of the soils adjacent to the flooring abatement work areas, ARCADIS will collect a representative number of soil samples from the excavation to document the effectiveness of the removal and that the remaining soil has less than 0.1% asbestos content by weight, and copper, lead and Aroclor 1254 concentrations below the cleanup levels listed in Section 1.3.1.

If the soil samples indicate asbestos, copper, lead, or Aroclor 1254 concentrations higher than the their respective cleanup criteria, the Contractor will be required to excavate additional soil until the representative confirmation soil samples meet the criteria. This additional excavation work will be compensated for on a pre-approved unit rate basis.

3.11 CLEARANCE DOCUMENTATION

When asbestos abatement is complete, ACM waste is removed from the regulated areas, and final clean-up is completed, ARCADIS will document the areas as complete before allowing the warning signs and boundary warning tape to be removed. The Contractor and ARCADIS shall visually inspect all surfaces within the work areas for residual material or accumulated debris. The Contractor shall re-clean all areas showing dust or residual materials. ARCADIS will document in writing that the area is complete before unrestricted entry is permitted.

3.12 CLEANUP AND DISPOSAL

3.12.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall remain the property of the US Army and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

3.12.2 Collection and Disposal of Asbestos

All ACM waste shall be collected and including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in leak-tight containers such as double plastic bags; sealed double wrapped polyethylene sheet; sealed fiberboard boxes; or other approved containers. Waste within the containers shall be adequately wetted in case the container is breeched. Asbestos-containing waste shall be disposed of at an EPA and state approved landfill.

For temporary storage, sealed impermeable containers shall be stored in a locked/secured asbestos

waste load-out unit or in a storage/transportation conveyance (i.e., dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by ARCADIS. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards.

The Contractor shall be responsible for coordinating transportation and disposal of all waste materials generated during performance of the work with Capitol Environmental, Inc., of Roanoke, Va.

3.12.3 Scale Weight Measurement

Scales used for measurement shall be public scales. Weighing shall be at a point nearest the work at which a public scale is available. Scales shall be standard truck scales of the beam type; scales shall be equipped with the type registering beam and an "over and under" indicator; and shall be capable of accommodating the entire vehicle. Scales shall be tested, approved and sealed by an inspector of the State in which the scale resides. Scales shall be calibrated and resealed as often as necessary and at least once every three months to ensure continuous accuracy. Vehicles used for hauling ACM shall be weighed empty daily at such time as directed and each vehicle shall bear a plainly legible identification mark.

3.12.4 Weigh Bill and Delivery Tickets

Copies of weigh bills and delivery tickets shall be submitted to ARCADIS during the progress of the work. The Contractor shall furnish ARCADIS scale tickets for each load of ACM weighed and certified. These tickets shall include tare weight; identification mark for each vehicle weighed; and date, time and location of loading and unloading. Tickets shall be furnished at the point and time individual trucks arrive at the worksite. A master log of all vehicle loading shall be furnished for each day of loading operations. Before the final statement is allowed, the Contractor shall file with ARCADIS certified weigh bills and/or certified tickets and manifests of all ACM actually disposed by the Contractor for this contract.

3.12.5 Asbestos Waste Shipment Record

The Contractor shall complete and provide ARCADIS final completed copies of the Waste Shipment Record for all shipments of waste material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill. Each Waste Shipment Record shall be signed and dated by the Contractor, the waste transporter and disposal facility operator.

---- END OF SECTION ----

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____
PROJECT ADDRESS _____
CONTRACTOR FIRM NAME

_____

EMPLOYEE'S NAME _____,_____,_____,
(Print) (Last) (First) (MI)

Social Security Number: _____-_____-_____,

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:

_____ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

b. For Workers:

_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

(3) For OSHA Class II work (there will only be abatement of one type of Class II material):

_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926, Section .1101(g) and hands-on training.

_____ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101, and hands-on training.

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101(g) and hands-on training.

_____ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:

_____ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:

_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:

_____ I have been trained in the proper selection, fit, use, care, cleaning,maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:

_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have

included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks.
_____ were identified physical limitations to performing the required work tasks.

Date of the medical examination _____

Employee Signature _____ date _____
Contractor's Industrial
Hygienist Signature _____ date _____

SECTION 02110

VEGETATION CLEARING

PART 1 GENERAL

1.1 DESCRIPTION

A. The Work covered by this Section consists of furnishing all equipment, tools, and labor necessary for clearing of trees, brush, and perishable material of whatever nature, and on-site/off-site disposal to an approved facility of all such material. All work shall be performed as directed by the ENGINEER.

1.2 QUALITY ASSURANCE

A. All materials, procedures, operations, and methods shall be in strict conformance with the Drawings and Specifications, and shall be subject to strict quality control monitoring as detailed herein and in the Construction Quality Assurance/Quality Control (CQA/QC) Plan prepared for this project.

1.3 MATERIALS OWNERSHIP

A. Except for materials indicated to be chipped and disposed on-site, cleared material shall be properly removed from the site for off-site disposal at an approved facility by the CONTRACTOR.

PART 2 PRODUCTS
(not used)

PART 3 EXECUTION

3.1 CLEARING REQUIREMENTS

A. Clearing shall be performed only in those areas that require construction activity, such as filling, excavation, or construction access. Clearing shall be performed in such a manner as to minimize as much as possible the overall disturbance to the site.

B. If clearing is necessary for access; then all trees, brush, grasses, and other vegetative material shall be removed to the existing ground surface.

C. Areas outside of the limits of disturbance shall be protected from damage, and no equipment or materials shall be stored or perform work in those areas.

3.2 DISPOSAL OF MATERIALS

A. All above ground portions of trees, brush, limbs, originating from outside the anticipated excavation area (as determined by the CONSTRUCTION MANAGER) shall be chipped and left on site.

B. All below ground portions of trees and brush originating from within the excavation area (as determined by the ENGINEER) shall impacted by asbestos and inorganic materials, thus they are to be disposed of in accordance with federal, state, and local regulations pertaining to the handling and disposal of asbestos containing materials.

C. General refuse and debris that accumulates during the course of construction shall be disposed in separate containers supplied by the CONTRACTOR. Refuse shall be accumulated and disposed periodically. The CONTRACTOR shall be responsible for the hauling and off-site disposal of debris and refuse accumulated in these containers in accordance with all federal, state, and local regulations.

D. All refuse and debris identified by the ENGINEER for disposal shall be contained at all times. The CONTRACTOR shall be responsible for the hauling and proper off-site disposal of debris and refuse in a licensed facility, and in accordance with all federal, state and local regulations.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.1 DESCRIPTION

A. The Work covered by this Section consists of furnishing all materials, labor, tools, equipment, and transportation necessary for all construction as it pertains to the excavating, staging, backfilling, compacting, and grading of earthwork. The Work includes all hauling, staging, covering, wetting or drying, dewatering, compacting, and other operations pertaining thereto for constructing and preparing the earthwork in accordance with these Specifications or as directed by the ENGINEER.

B. The Work shall include, but not be limited to, the following activities:

1. Demarcating the excavation areas for the BLA and IAA;

2. Excavation and loading of the impacted soils from the above mentioned areas;

3. Coordinating between Capital Environmental (the transportation and disposal vendor) and the CONTRACTOR to ensure that waste materials are transported and disposed of in an expedient manner;

4. Excavating, loading, hauling, testing, placing and compaction of Vegetative Layer Soil for all areas of excavation;

5. If necessary; loading, hauling, testing, placing, and compaction of Common Borrow soil for all excavated areas that exceed a depth of 1.0 ft bgs;

C. No soils shall be removed from the site unless otherwise instructed or approved by the ENGINEER.

D. Backfill soil shall consist of material approved by the ENGINEER from on-site or off-site sources, which have previously been accepted, and/or approved materials removed from stripping or excavation. During construction, the excavation areas shall be well drained. No materials shall be filled when either the material or the surfaces on which it is to be placed is frozen, excessively wet, or soft. When the Work is interrupted by heavy precipitation or freezing temperatures, fill operations shall not be resumed until the ENGINEER determines that the moisture content, density, and integrity of the previously-placed soils are as specified.

1.2 REFERENCES

This section intentionally left blank.

1.3 DEFINITIONS

A. "Vegetative Layer Soil" includes soils that shall be utilized as topsoil at the fill surface to support vegetative growth, or general fill material for site grading purposes.

B. "Common Borrow Soil" includes those soil materials required for fill materials above the existing natural soil and below the vegetative layer.

1.4 QUALITY ASSURANCE

A. All materials, procedures, operations, and methods shall be in strict conformance with the Drawings and Specifications and shall be subject to strict quality control monitoring as detailed herein. The placed fill soils shall conform exactly to the Drawings and Specifications, except as otherwise authorized in writing by the ENGINEER.

B. The CONTRACTOR shall provide a certificate issued by the soil borrow source stating that the soil is a certified clean fill source. In addition, the CONTRACTOR shall collect soil and analyze the borrow soil for the following parameters prior to its approval as a backfill material by the ENGINEER. The following parameters shall be collected at a frequency of 1 sample per 200 cubic yards of backfill.

- Volatile Organic Carbons (United States Environmental Protection Agency [USEPA] Method 8260);
- Semi-Volatile Organic Carbons (USEPA Method 8270);
- Target Analyte List Metals (USEPA Method 6010B);
- Pesticides/Herbicides (USEPA Method 8081A); and
- Polychlorinated Biphenols (USEPA Method 8082B).

C. The CONTRACTOR shall comprehend and anticipate the CQA activities and account for these activities in the installation schedule.

1.5 SUBMITTALS

A. The CONTRACTOR shall submit the location of all borrow sources to the CQA Site Manager with the bid.

B. The CONTRACTOR shall submit the results of the analytical test listed in Part 1.4 for each borrow source to verify that the soil materials meet the clean fill requirements.

1.6 SOIL TESTING

A. The testing frequency required in Part 1.4 of this Section may be increased at the discretion of the ENGINEER when visual observation or construction performance indicates a potential problem.

PART 2 PRODUCTS

2.1 VEGETATIVE LAYER SOIL

A. The Vegetative Layer Soil shall consist of loose, friable, and loamy soil material (loam, sandy loam, silty loam, sandy clay loam, clay loam) and shall be free of debris, trash, stumps, rocks, roots, and weeds. Vegetative Layer Soil shall be able to support healthy vegetation and shall not contain substances that may be toxic to humans or plants. The pH shall range from 6.0 to 7.5.

2.2 COMMON BORROW SOIL

A. Common Borrow soils shall consist of mineral soil substantially free from organic materials, loam, wood, trash, and other objectionable materials which may be compressible or which cannot be properly compacted. Common Borrow soils shall not contain stones larger than three (3) inches in largest diameter and shall be classified according to the Unified Soil Classification System (USCS) as SM, SC, ML, or CL. Common Borrow soils shall have a maximum plasticity index of 40. Common Borrow soils shall not contain sound rock, broken concrete, masonry rubble, or other similar materials. It shall have physical properties such that it can readily spread during filling. Snow, ice, and frozen soil shall not be permitted. Common Borrow soils shall be used for fill above the excavation floor, and below the vegetative layer in the excavated areas, if needed.

PART 3 EXECUTION

3.1 GENERAL

A. Wet, soft, frozen, or otherwise unsuitable subgrade, including organic materials, shall be excavated and backfilled with foundation material, as approved by the ENGINEER, so that the original materials will ultimately be placed on a firm foundation.

B. Off-site structures, utilities, roadways, and other facilities shall be protected from damage caused by settlement, lateral movement, undermining, wash-out, and other hazards created by the earthwork operations or delivery of fill materials.

C. Pumping and Drainage

1. Where required, design of an appropriate dewatering system will be the responsibility of the CONTRACTOR and shall be submitted to the ENGINEER for review prior to commencing Work.

2. If necessary, dewatering shall be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils.

3. If necessary, as directed by the ENGINEER, water entering the limits of the Work area from surface runoff shall be re-directed, via conveyance berms or ditches, around the perimeter of the excavation and discharged to stable ground such that no erosion occurs at the point of discharge.

4. All additional precautions shall be taken to prevent uplift of any structure during construction.

5. If necessary, drainage water shall be directly disposed in accordance with these Specifications, unless otherwise approved by the ENGINEER, to ensure that that no sediment-laden runoff leaves the site and that erosion does not occur due to the re-direction/disposal of water.

6. If necessary, removal of dewatering equipment shall be accomplished after the system is no longer required. The material and equipment constituting the system shall be removed by the CONTRACTOR.

7. All precautions necessary to preclude the accidental discharge of fuel, oil, etc. shall be taken in order to prevent adverse effects on surface water or groundwater quality.

D. If the moisture content of the fill material is outside the acceptable range, the soil shall be wetted or dried, as appropriate.

1. Fill material that is too wet to permit compaction shall be removed and staged or spread and allowed to dry. Drying may be addressed by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory level.

2. Fill material that is too dry shall be wetted uniformly so as to prevent free water appearing on the surface during or subsequent to compaction operations.

E. Any delays in progress due to wetting or drying of soil are the responsibility of the CONTRACTOR.

F. Fill materials shall be placed in such a manner as to facilitate drainage at all times. Ponding of surface-water run-off shall not be permitted.

G. If compaction or other tests indicate that any portion of the Work does not meet the specified requirements, then the CONTRACTOR shall remove that section, replace, and recompact at no additional cost to the OWNER REPRESENTATIVE. Determinations of the extent of removal and the acceptability of the in-place fill materials shall be made by the ENGINEER.

H. If significant precipitation causes wet conditions, placement and compaction activities shall be terminated until the conditions have dried sufficiently to continue according to the ENGINEER.

I. Equipment or vehicles shall not be allowed to travel in a single track or form ruts. Any ruts or irregularities formed shall be scarified and re-compacted by the CONTRACTOR at its expense as required and directed by the ENGINEER.

J. Prior to filling activities in the excavated area, the areas shall be prepared in accordance with the Specifications. The existing soils shall be proof-rolled to achieve a compact, uniform grade, and the surface shall be free of stones, limbs, or other debris.

K. Inspection:

1. Prior to implementing any of the Work in this Section, the CONTRACTOR shall carefully inspect the installed Work of all other Sections and verify that all Work is complete to the point where the Work of this Section may properly commence without adverse impact.

2. If the CONTRACTOR has any concerns regarding the installed Work of other Sections, the CONTRACTOR shall notify the ENGINEER in writing. Failure to notify the ENGINEER prior to conducting Work within this or other Sections shall be construed as the CONTRACTOR's acceptance of the related Work of all other Sections.

L. The CONTRACTOR shall protect on-going and completed work from precipitation, excessive heat, freezing, and other elements to avoid compromising the integrity of prior Work. Prior Work affected by such conditions shall be repaired by the CONTRACTOR at no additional cost to the OWNER REPRESENTATIVE.

M. Frozen soils of any type shall not be placed on the site.

N. All Work shall be in compliance with the Erosion and Sediment Control standards presented in Technical Specification 02290.

3.2 FILLING

A. Vegetative Layer Soil

1. The Vegetative Layer Soil shall meet the requirements of Part 2.1 of this Section. Soil mixing is permitted to achieve the desired characteristics. Soil mixing shall be conducted prior to placing the material, and the mixed material shall be tested in accordance with this Section.

2. All ground areas disturbed by construction during this project and not built over, paved, or otherwise surfaced shall be covered with a Vegetative Layer Soil.

3. Prior to placing the Vegetative Layer Soil, vegetation shall be removed from the area, and the ground surface shall be cleared of all other materials that would hinder proper grading, tillage, or subsequent maintenance operations.

4. Subsequent to grading, the areas to be covered with topsoil shall be thoroughly scarified by approved means to a depth of at least 2 inches for bonding of Vegetative Layer Soil with the subsoil. The Work shall be performed only during periods when beneficial results are likely to be obtained; i.e. when conditions are such, by reason of drought, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, the Work will be stopped by the ENGINEER and shall be resumed only when directed. Undulations or irregularities in the surface that would interfere with further construction operations or maintenance shall be leveled before the next specified operation.

B. Common Borrow Soil

1. Common Borrow material shall meet the requirements of Part 2.2 of this Section.

2. Common Borrow shall be placed in maximum lifts of approximately 6 inches.

C. The CONTRACTOR shall maintain all Work areas free from dust. Dust control measures shall be available for use at the site at all times. The ENGINEER will observe dust emissions. Approved dust control measures include the sprinkling of water.

D. All grading activities shall be conducted in compliance with all applicable OSHA regulations and the HASP.

3.3 EXCESS MATERIALS

A. No excavated materials shall be removed from the site, except as specified or approved by the ENGINEER. All general waste or debris shall be containerized on-site and periodically disposed off-site in accordance with these Specifications.

B. Suitable materials, as determined by tests discussed in these specifications, shall be classified and staged in approved areas for immediate or future use.

C. Staged soils shall be graded to drain; no surface-water ponding is permitted in staging areas. Staged soils may be covered with plastic sheeting or other material to preserve the soil integrity. Proper erosion controls (i.e., silt fence) shall be installed at the perimeter of the staged soils.

D. Staged soils shall be protected as soon as possible by temporary seeding but not more than thirty (30) working days after placing the staged soils. Staged soils shall be covered as discussed in Paragraph 3.3 C, or be permanently vegetated in accordance with the Virginia regulations if not utilized within twelve (12) months.

3.4 GRADING

A. Uneven areas and low spots, which may develop in the grading operations, shall be eliminated via placement of appropriate fill materials.

B. All excavation areas should be backfilled to match the surrounding grade and promote positive drainage away from the building foundations. All transitions should be smooth and neat.

C. The right is reserved by the ENGINEER to make minor adjustments or revisions in lines or grades, if found necessary as the Work progresses, in order to obtain satisfactory construction.

D. The CONTRACTOR shall maintain all excavations, staging area, access roads, and Work areas free from excess dust. Dust control measures shall be available for use at the site at all times. The ENGINEER will observe dust emissions. Approved dust control measures include the sprinkling of water.

3.5 CRITERIA AND TOLERANCES

A. Soil shall be compacted to a visually acceptable standard as determined by the ENGINEER

END OF SECTION

SECTION 02250

TRANSPORTATION AND DISPOSAL OF MATERIAL

PART 1 GENERAL

1.1 DESCRIPTION

A. Capital Environmental is the selected transportation and disposal vendor. Capital Environmental and the CONTRACTOR shall coordinate with each other for the expedient transportation and disposal of soil.

B. The CONTRACTOR shall furnish all equipment, tools, materials, and labor necessary to support the expedient transportation and disposal of all contaminated soil as specified in the Specifications

1.2 REGULATORY REQUIREMENTS

A. All contaminated soil should be disposed in an approved waste disposal facility in accordance with all federal, state and local regulations.

B. All applicable regulatory requirements and all federal, state, county or local laws, codes and ordinances which govern the transportation and disposal of material to be removed from the site shall be adhered to during all phases of loading, transporting, and disposal of waste.

C. Capital Environmental shall obtain any and all permits required for transport and disposal and comply with all applicable requirements.

1.3 TRANSPORTATION

A. The CONTRACTOR shall provide all access and egress routes to the site. This may include, but is not limited to temporary roadways, ramps, steel plates and gravel materials.

B. Queuing of trucks that occurs on-site shall not interfere with daily operations.

1.4 SUBMITTALS

A. Capital Environmental shall submit written documentation certifying that the disposal facility is in compliance with all regulations and permits, and is willing to accept the material. The CONTRACTOR shall not commence with the removal of contaminated soil, or any other materials to be removed from the site, until the ENGINEER has approved the submitted information.

B. The CONTRACTOR shall submit copies of results of any test performed at the disposal facility by the disposal facility. The ENGINEER will perform testing required for disposal of soil material.

C. The CONTRACTOR shall submit copies of weigh tickets or other receipts provided by the disposal facility to the ENGINEER as evidence of the arrival and disposal of the material at the disposal site. The documentation submitted to the ENGINEER shall, at a minimum, identify the origin of the material, the quantity of the material (tons), the identification of the

transport vehicle, the type of material and the date the material was disposed of at the facility.

1.5 DISPOSAL FACILITIES

A. The disposal facility shall be approved by the ENGINEER. The disposal facility shall be in compliance with all current federal and state regulations governing construction and operation of a solid waste landfill. Capital Environmental shall be responsible for location of disposal facilities; e.g., solid waste disposal facility, hazardous waste disposal facility, etc., which shall accept all materials from the site.

1.6 ALTERNATE DISPOSAL FACILITY

A. In the event that the identified and approved facilities cease to accept the stated materials or the facility cease operations, it is Capital Environmental's responsibility to locate an alternate approved and permitted facility for accepting materials. Capital Environmental is responsible for making the necessary arrangements to utilize the facility and the alternate facility must be approved in writing by the ENGINEER in the same manner and with the same requirements as the original facility before the contaminated soil is removed from the site.

PART 2 PRODUCTS

(not used)

PART 3 EXECUTION

3.1 PERSONNEL PROPTECTIVE EQUIPMENT

A. Personal Protective Equipment used during construction activities shall be disposed in a solid waste disposal facility approved by the engineer.

3.2 VEHICLE DECONTAMINATION CLEANLINESS

A. No vehicles shall leave the area of disturbance until they are properly inspected and approved by the CONTRACTOR'S Health and Safety Officer and ENGINEER for general cleanliness of tires and frames.

B. No vehicle shall leave the site unless it is in a clean condition, free of loose dirt or loose material on tailgates, axles, wheels, etc.

C. No vehicle shall leave the site with contaminated soil unless the materials are tightly covered/tarped so that no material/dust is able to blow off and/or drop off.

D. Loading and transportation of contaminated soils shall be conducted in a manner as to eliminate all dust. Dust control measures shall be available for use at the site at all times. The ENGINEER will observe dust emissions. Approved dust control measures include the sprinkling of water.

E. All personnel, equipment, and trucks shall enter and exit the site from one common location. Prior to exiting the site, all decontamination requirements of these specifications and the Health and Safety Plan shall be met.

F. In the event that impacted soil is spilled from the truck during transportation, Capital Environmental shall take the following steps.

i) If impacted soil is spilled on-site, Capital Environmental shall immediately notify the ENGINEER. Capital Environmental is responsible for immediate removal of the soils and cleaning the area to the satisfaction of the ENGINEER.

ii) If contaminated soil is spilled off-site, Capital Environmental shall immediately notify the ENGINEER and OWNER REPRESENTATIVE. The appropriate cleanup activities shall be coordinated without delay.

G. Capital Environmental shall bear full responsibility for any required clean up of all spilled, impacted materials. All clean up and remediation activities associated with spilled materials shall be performed at no extra cost to the ENGINEER or OWNER REPRESENTATIVE.

3.3 TRANSPORTATION LOG

A. The CONTRACTOR shall maintain at the site a log of vehicles leaving the site with contaminated soil or other materials removed from the areas of impact at the site. The log shall indicate the vehicle identification number, date and time of departure, and approximated volume or quantity of material carried.

END OF SECTION

SECTION 02290

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

A. The Work covered by this Section consists of furnishing all materials, equipment, tools and labor to construct and maintain erosion and sediment control systems.

B. The Work to be performed includes, but is not limited to the installation or construction of silt fence, as specified herein and as shown on the Drawings.

1.2 REFERENCES

A. Virginia Erosion and Sediment Control Handbook, Third Edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1992.

1.3 QUALITY ASSURANCE

A. All materials, procedures, operations, and methods shall be in strict conformance with the Drawings and these Specifications and shall be subject to strict quality control monitoring as detailed herein and in the Remedial Action Work Plan prepared for this project. The installed erosion and sediment controls shall conform exactly to the Drawings and these Specifications, except as otherwise authorized in writing by the ENGINEER.

B. The CONTRACTOR shall periodically inspect and maintain proper erosion and sediment control measures throughout the duration of the project including weekends and holidays. All erosion and sediment controls shall be maintained as necessary for rainfalls one inch (1") or greater.

C. The CONTRACTOR shall comprehend and anticipate the CQA activities and account for these activities in the installation schedule.

1.4 SUBMITTALS

Product data shall be submitted as indicated in Section 01300 - SUBMITTALS.

PART 2 PRODUCTS

2.1 EROSION AND SEDIMENT CONTROL MATERIALS

A. Silt Fence: The CONTRACTOR shall supply silt fence to control surface-water runoff and sediment. Acceptable silt fence material shall meet or exceed the criteria provided in the Drawings. The CONTRACTOR shall submit the manufacturer's product data to the ENGINEER for approval.

PART 3 EXECUTION

3.1 TRANSPORTATION, HANDLING AND STORAGE

Materials shall be handled in such a manner as to prevent damage to the material. Materials shall not be dropped or dragged over the ground. Any materials damaged shall be replaced at no additional expense to the OWNER.

3.2 EROSION AND SEDIMENT CONTROL STRUCTURES

A. Silt Fence: The CONTRACTOR shall install silt fence in accordance with these Specifications, the manufacturer's installation instructions, the Drawings, or as directed by the ENGINEER. Presiding authority shall be as follows, in descending order: ENGINEER's direction, Drawings, Specifications, manufacturer's installation instructions. The CONTRACTOR shall maintain the silt fence until permanent vegetation is established.

TABLE 02290-1

SILT FENCE PROPERTIES[1]

Properties	Qualifier	Specified Value	Test Method
Filtering efficiency	Minimum	85%	ASTM 5141
Standard strength	Minimum	30 lbs/inch	ASTM D4632
High Strength	Minimum	50 lbs/inch	ASTM D4632

END OF SECTION

SECTION 02936

ESTABLISHMENT OF VEGETATION

PART 1 GENERAL

1.1 DESCRIPTION

A. The CONTRACTOR shall furnish all equipment, tools, materials, and labor necessary for establishing temporary and permanent vegetative cover e.g., seeding, fertilizing, and mulching, on all areas disturbed at the site by performance of the Work.

1.2 REFERENCES

A. The following publications of the issues listed below form a part of these Specifications. The publications are referenced in the text by basic designation only.

1. U.S. DEPARTMENT OF AGRICULTURE (USDA)
Federal Seed Act of 9 August 1939 (53 Stat. 1275)

2. Virginia Erosion and Sediment Control Handbook, Third Edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservations, 1992.

1.3 QUALITY ASSURANCE

A. All materials, procedures, operations, and methods shall be in strict conformance with the Drawings and Specifications, and shall be subject to strict quality control monitoring as detailed herein.

1.4 GENERAL REQUIREMENTS

A. The specified seed varieties and quantities shall be uniformly distributed over the disturbed area in such a manner that will produce an even stand of grass over the entire area seeded. The CONTRACTOR shall notify the ENGINEER at least five (5) days prior to seeding operations.

1.5 SUBMITTALS

A. In accordance with Section 01300 - SUBMITTALS, the CONTRACTOR shall submit the following items:

1. Certificates of Compliance or Reports:

a. Seed; and
b. Fertilizer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. During delivery, seed shall be protected from any drying or contamination by detrimental material.

2. Seeding material shall be inspected upon arrival at the site; unacceptable material shall be immediately removed from the site by the CONTRACTOR.

3. Fertilizer shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance with Commonwealth of Virginia and federal laws and regulations.

B. Storage:

1. Seed and fertilizer shall be stored in cool, dry locations away from contaminants.

2. Materials shall be stored in areas designated or approved by the ENGINEER.

PART 2 MATERIALS

2.1 MATERIALS

A. Seed shall be of the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination, weed-seed content, and inert material. Labels shall conform to U.S. Department of Agriculture Federal Seed Act, Rules & Regulations and applicable Commonwealth of Virginia seed laws. Wet, moldy, or otherwise damaged seed will be rejected. Seed Mixture - seed mixture of each seed lot shall be as described in Table 02936-1: Seeding Requirements, or as directed by the ENGINEER.

B. Fertilizer shall be controlled-release, commercial grade, granular free flowing, uniform in composition, delivered in fully labeled sealed containers, and shall conform to applicable Commonwealth of Virginia and federal regulations. Fertilizer shall bear the manufacturer's guaranteed statement of analysis.

C. Vegetative Soil Layer

The Vegetative Soil Layer shall contain a sufficient amount of organic material to promote the growth of vegetation. Vegetative Soil Layer shall meet the requirements in Section 02200 - EARTHWORK. Additives, which may be deemed necessary by the CONTRACTOR, shall be submitted to the ENGINEER for review and approval prior to application.

D. Mulch

The choice of materials for mulching will be based on soil and site conditions, season, and economics. Recommendations have been made in the following text. These are to be used

as guidelines and any changes to these recommendations must be submitted to and approved by the ENGINEER.

1. Straw Mulch shall be unrotted stalks from oats, wheat, or rye that are free from noxious weeds, mold, or other objectionable material. The straw mulch shall contain at least 50 percent by weight of the material to be ten (10) inches or longer. Straw shall be in an air-dry condition and suitable for placing with blower equipment. Once placed, the straw shall be kept moist or tied down to reduce loss due to wind.

2. Hydro-Mulch Overspray Tackifier shall be the same as, or equal to, a recycled slick paper (containing wood cellulose and kaolinite clay), shall not contain any growth or germination-inhibiting factors, and shall be dyed an appropriate color to facilitate visual metering during application. Slick paper composition on air-dry weight basis: 8 percent moisture maximum, pH 4.5 - 6.5. When added to water, it shall form homogenous slurry specifically for use in hydraulic mulching equipment. This material when sprayed on the straw mulch becomes a tackifier/binder and provides a stable bed for seed germination.

E. Water shall be of a quality suitable for irrigation.

PART 3 EXECUTION

3.1 DATES FOR SEEDING

A. Seeding shall be performed when exposed soil surfaces are anticipated not to be disturbed for a period of thirty (30) days to one (1) year, or as directed by the ENGINEER. Seeding shall occur when the ground is free of conditions that would otherwise impair germination and establishment of seed bed (e.g., snow covering soil, saturated soils, standing water).

3.2 PREPARATION OF SEEDBED

A. The soil shall be scarified prior to the application of seed. When drought, excessive moisture, or other unsatisfactory conditions prevail, the Work shall be stopped. The soil surface shall be leveled to meet finish grade requirements before seeding. Seedbed preparation shall be performed on the contour to reduce soil loss.

B. Fertilizer and Lime Rate

Fertilizer and Lime shall be applied at the rate according to soil test recommendations such as offered by the U.S. Department of Agriculture or as determined by the results of the CONTRACTOR's Agricultural Soil Test. The following rates are provided as a comparison to these recommendations.

1. The fertilizer shall be applied at a rate of 90 pounds per acre of 10-10-10 or equivalent.

3.3 PLANTING SEED

A. Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other causes, shall be reworked to restore the ground condition previously specified. Seed shall be planted at the rate specified herein.

B. Seeding mixture shall be applied at the seeding rates specified on Table.

1. Broadcast Seeding

The CONTRACTOR shall broadcast seed by hand or with approved gravity or cyclone type spreading equipment. Broadcast seedings shall be covered to an average depth of ¼ to ½-inch. Completed seeding shall be mixed into soil with a harrow or rake and compacted with a cultipacker-type roller providing 60 to 90 pounds weight per linear foot of roller, light drag, or by equivalent approved hand rolling or compacting methods. Broadcast seeding will not be permitted when wind velocity is such as to prevent uniform seed distribution. Do not sow immediately following rain or when ground is too dry.

1. Hydroseeding

Hydraulic application (Hydroseeding) is a suitable method for use on critical areas. If hydroseeding is used and the seed and fertilizer is mixed, they shall be mixed on site, and the seeding shall be immediate and without interruption. Slopes must be no steeper then 2 to 1 (horizontal to vertical). Seeding rates must be increased 10 percent when hydroseeding.

3. Mulching

The CONTRACTOR shall perform mulching on the same day as planting seed. Areas, which cannot be seeded within the growing season, shall be mulched to provide temporary protection to the soil surface. An organic mulch other than wood fiber alone shall be used, and the area then seeded as soon as seeding dates permit.

a. Applying Mulch

Straw mulch shall be spread uniformly, by hand, or machine. When spreading mulch by hand, divide the area to be mulched into approximately 1,000 square foot sections and place 90 pounds (2 bales) of straw or hay in each section to ensure uniform distribution, or as directed by the ENGINEER. The mulch shall be spread in such manner as to prevent bunching.

b. Securing Mulch

Immediately following (the same day) the spreading of the mulch, the material shall be anchored securely to the soil by use of the Hydro-Mulch Overspray Tackifier material. The material shall be applied by a hydroseed blower, or as approved by the ENGINEER. The material shall be applied in a raining technique to prevent bunching and displacement of the straw mulch.

c. Mulch Maintenance

All mulches must be inspected periodically by the CONTRACTOR, in particular after rainstorms, to check for rill erosion. If less than 90 percent of the soil surface is covered by mulch, additional mulch needs to be immediately applied by the CONTRACTOR.

3.4 PROTECTION AND CLEANUP

A. After seeding and mulching operations have been completed, barricades and approved warning signs shall be erected by the CONTRACTOR, as required, to provide protection against traffic and trespass. Excess material and all debris from seeding and mulching operations, shall be cleaned up and disposed off-site by the CONTRACTOR, unless otherwise directed by the ENGINEER.

3.5 ESTABLISHMENT AND MAINTENANCE PERIOD

A. Establishment Period

The CONTRACTOR is responsible for the establishment and maintenance of permanent seeding for a minimum period of one (1) year from the date of the establishment of vegetative coverage. Establishment of vegetative coverage is defined as follows:

1. Vegetative growth over 95 percent of the seeded surface;

2. Growth of the vegetation shall have reached a minimum blade length of at least three (3) inches;

3. No bare spots greater than ten (10) square feet can be observed; and

4. Ground cover is achieved, which is mature enough to control soil erosion and to survive severe weather conditions.

B. Maintenance Period

The CONTRACTOR shall be responsible for maintenance of temporary and permanent seeding and mulch for up to one (1) year, until receiving the Certificate of Final Acceptance. Maintenance activities performed by the CONTRACTOR shall include:

1. The CONTRACTOR shall repair and seed patches of dead vegetation, which are the result of improper seeding practices.

2. Eroded or damaged areas shall be repaired and reseeded by the CONTRACTOR.

3. The CONTRACTOR shall maintain and ensure that mulch covers at least over 90 percent of soil surface.

TABLE 02936-1

SEEDING REQUIREMENTS[1]

SPECIES	MINIMUM SEEDING RATES	
	LBS PER ACRE	SEEDING DATES
Oats	80	2/1-5/31 and 8/1-9/30
Cereal: Rye/Wheat	90/20	1/1-5/31 and 7/15-11/15
Millet, Sudangrass	45/60	5/1-8/15
Annual Ryegrass	75	1/1-5/31 and 7/15-9/30
Annual Lespedeza[1] Plus Tall Fescue	15 PLUS 45	1/1-5/31

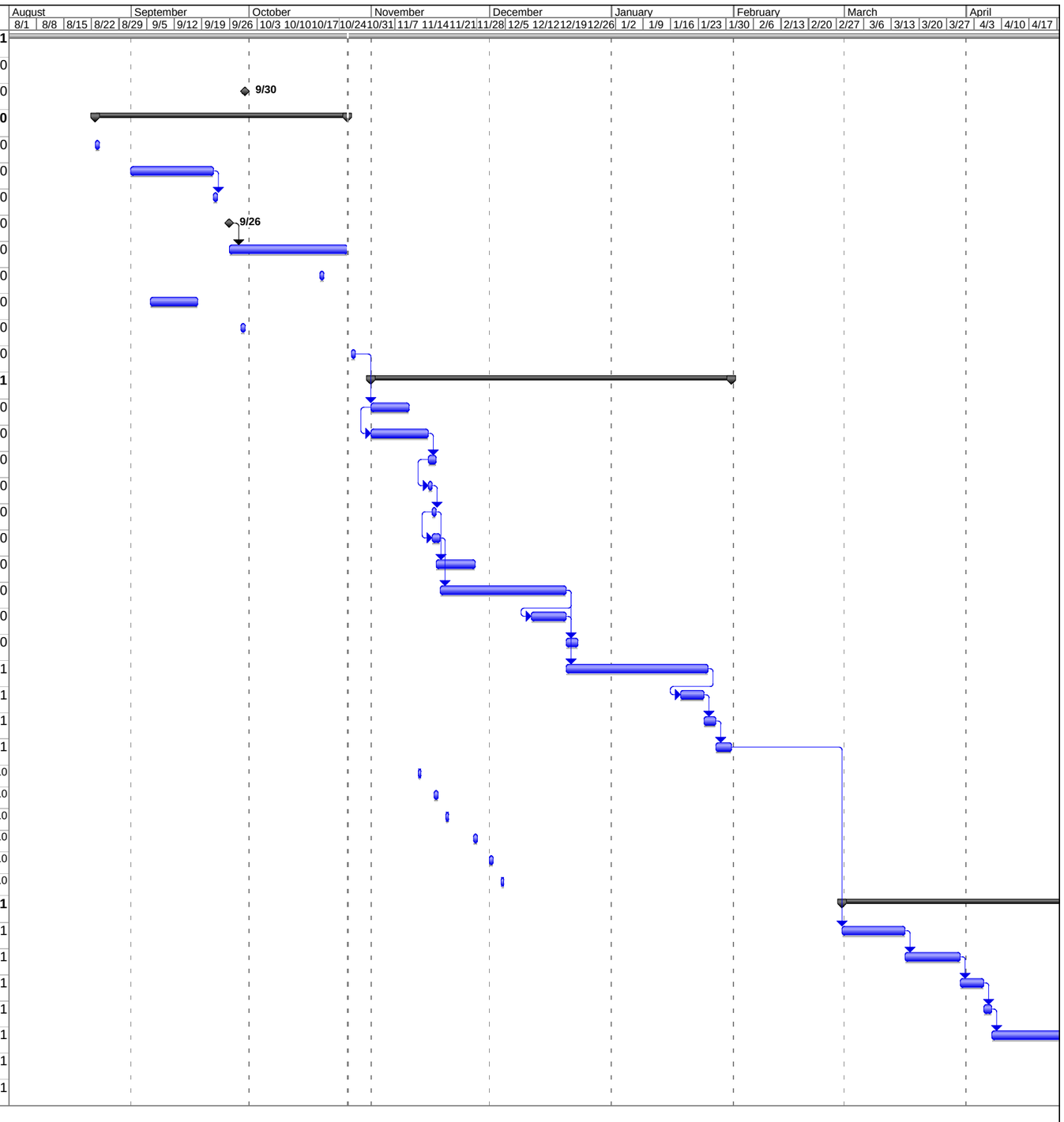
Notes:
1. If there is any possibility that the seeding will be required to control erosion for more than one year, incorporate another permanent species as part of mixture when seeding.

END OF SECTION

Appendix D

Project Schedule

ID	Task Name	Duration	Start	Finish
0	**BLA and IAA Response Actions for Soil and Conductive Flooring**	**228 days**	**Tue 7/13/10**	**Mon 5/16/11**
1	VDEQ Approval of Remedial Investigation Report	0 days	Tue 7/13/10	Tue 7/13/10
2	VDEQ Approval of Feasibility Study Report	0 days	Thu 9/30/10	Thu 9/30/10
3	**Proposed Plan**	**47 days**	**Mon 8/23/10**	**Tue 10/26/10**
4	Submit Draft Document to Army	1 day	Mon 8/23/10	Mon 8/23/10
5	Army Review	15 days	Wed 9/1/10	Tue 9/21/10
6	Finalize Proposed Plan	1 day	Wed 9/22/10	Wed 9/22/10
7	Publish Notice of Availability	0 days	Sun 9/26/10	Sun 9/26/10
8	Public Commet Period	30 edays	Sun 9/26/10	Tue 10/26/10
9	Public Meeting	1 day	Tue 10/19/10	Tue 10/19/10
10	Develop Bid Package for Remediation Contractors	10 days	Mon 9/6/10	Fri 9/17/10
11	Conduct Pre-Bid Contractor Site Walk	1 day	Wed 9/29/10	Wed 9/29/10
12	Select Remediation Contractor	1 day	Wed 10/27/10	Wed 10/27/10
13	**Conduct Response Actions**	**73 days**	**Mon 11/1/10**	**Mon 1/31/11**
14	Pre mobilization Coordination	10 days	Mon 11/1/10	Wed 11/10/10
15	Submit Asbestos Abatement Notifications	15 days	Mon 11/1/10	Mon 11/15/10
16	Personnel and Equipment Mobilization to RFAAP-NRU	2 days	Mon 11/15/10	Wed 11/17/10
17	Update Badges and Obtain Work Permits	1 day	Mon 11/15/10	Tue 11/16/10
18	Utility Clearance	1 day	Tue 11/16/10	Wed 11/17/10
19	Set up Work Zones, decon facilities, work trailers	2 days	Tue 11/16/10	Thu 11/18/10
20	Clear Vegetation	7 days	Wed 11/17/10	Sat 11/27/10
21	IAA Conductive Flooring Removal and Related Activities	26 days	Thu 11/18/10	Mon 12/20/10
22	IAA Soil Removal Action and Confirmation Sampling	7 days	Sat 12/11/10	Mon 12/20/10
23	IAA Backfill and Site Restoration	3 days	Mon 12/20/10	Thu 12/23/10
24	BLA Conductive Flooring Removal and Related Activities	25 days	Mon 12/20/10	Tue 1/25/11
25	BLA Soil Removal Action and Confirmation Sampling	4 days	Tue 1/18/11	Mon 1/24/11
26	BLA Backfill and Site Restoration	3 days	Mon 1/24/11	Thu 1/27/11
27	Demobilization (Equipment and Personnel)	2 days	Thu 1/27/11	Mon 1/31/11
28	Radford Hunt Date - Non Working Day	1 day	Sat 11/13/10	Sat 11/13/10
29	Radford Hunt Date - Non Working Day	1 day	Wed 11/17/10	Wed 11/17/10
30	Radford Hunt Date - Non Working Day	1 day	Sat 11/20/10	Sat 11/20/10
31	Radford Hunt Date - Non Working Day	1 day	Sat 11/27/10	Sat 11/27/10
32	Radford Hunt Date - Non Working Day	1 day	Wed 12/1/10	Wed 12/1/10
33	Radford Hunt Date - Non Working Day	1 day	Sat 12/4/10	Sat 12/4/10
34	**Response Action Completion Report**	**55 days**	**Mon 2/28/11**	**Mon 5/16/11**
35	Prepare Internal Draft Report	12 days	Mon 2/28/11	Wed 3/16/11
36	Army Review	10 days	Wed 3/16/11	Wed 3/30/11
37	Response to Comments	4 days	Wed 3/30/11	Tue 4/5/11
38	Submit Draft Report to VDEQ	2 days	Tue 4/5/11	Thu 4/7/11
39	VDEQ Review	1 mon	Thu 4/7/11	Thu 5/5/11
40	Response to Comments	5 days	Thu 5/5/11	Thu 5/12/11
41	Finalize Completion Report	2 days	Thu 5/12/11	Mon 5/16/11



Project: BLA and IAA Response Action
Date: Tue 10/26/10

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone