7/31/02-00396

WORK PLAN
RAC Action
St. Julien's Creek Annex
IRA at Sites 1, 3, 6, and 7
Chesapeake, Virginia

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000

Task Order No. 85

Prepared by:

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AHA	activity hazard analysis
CDM	Camp Dresser and McGee
CEHNC	US Army Engineering and Support Center, Huntsville
DRMO	Defense Recycling Management Operations
E & S	erosion and sedimentation
EOD	explosives ordnance disposal
EODMUTWO	Explosives Ordnance Disposal Mobile Unit Two
ESCP	Erosion and Sedimentation Control Plan
FSP	Field Sampling Plan
Ft^3	cubic feet
HASP	Health and Safety Plan
IRA	interim remedial action
LANTDIV	United States Navy Atlantic Division
LQMPs	Laboratory Quality Management Plans
NAVFACENGCOM	Naval Facilities Engineering Command
NAVSEAINST	Naval Sea Systems Command Instruction
NNSY	Norfolk Naval Shipyard
NTR	Navy technical representative
OE	Ordnance explosives
OHM	OHM Remediation Services Corporation
PAHs	polycyclic aromatic hydrocarbons
PID	photoionization detector
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	remedial investigation

ROICC	Resident Officer In Charge Of Construction
SJCA	St. Julien's Creek Annex
SSHASP	site specific health and safety plan
SSO	Site Safety Officer
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VDEQ	Virginia Department of Environmental Quality
WBS	work breakdown structure
XRF	X-ray diffraction analysis

1.0 INTRODUCTION

OHM Remediation Services Corporation (OHM) has been contracted by the United States Navy, Atlantic Division Naval Facilities Engineering Command [LANTDIV NAVFACENGCOM] to provide environmental remediation services at the St. Julien's Creek Annex interim remedial action (IRA), Sites 1, 3, 6, and 7, Chesapeake, Virginia. This work is being performed under Task Order 85 of LANTDIV Contract Number 62470-97-D-5000.

St. Julien's Creek Annex (SJCA) is a 490-acre parcel of Navy owned land located in the City of Chesapeake, Virginia. It is situated at the confluence of St. Julien's Creek and the Southern Branch of the Elizabeth River. Over the years, the property has served as an area providing various support functions to the nearby Norfolk Naval Shipyard including storage, staging, and landfill disposal. A Site Location Map is provided on **Figure 1**.

1.1 SITE BACKGROUND AND DESCRIPTION OF REMEDIAL ACTIONS

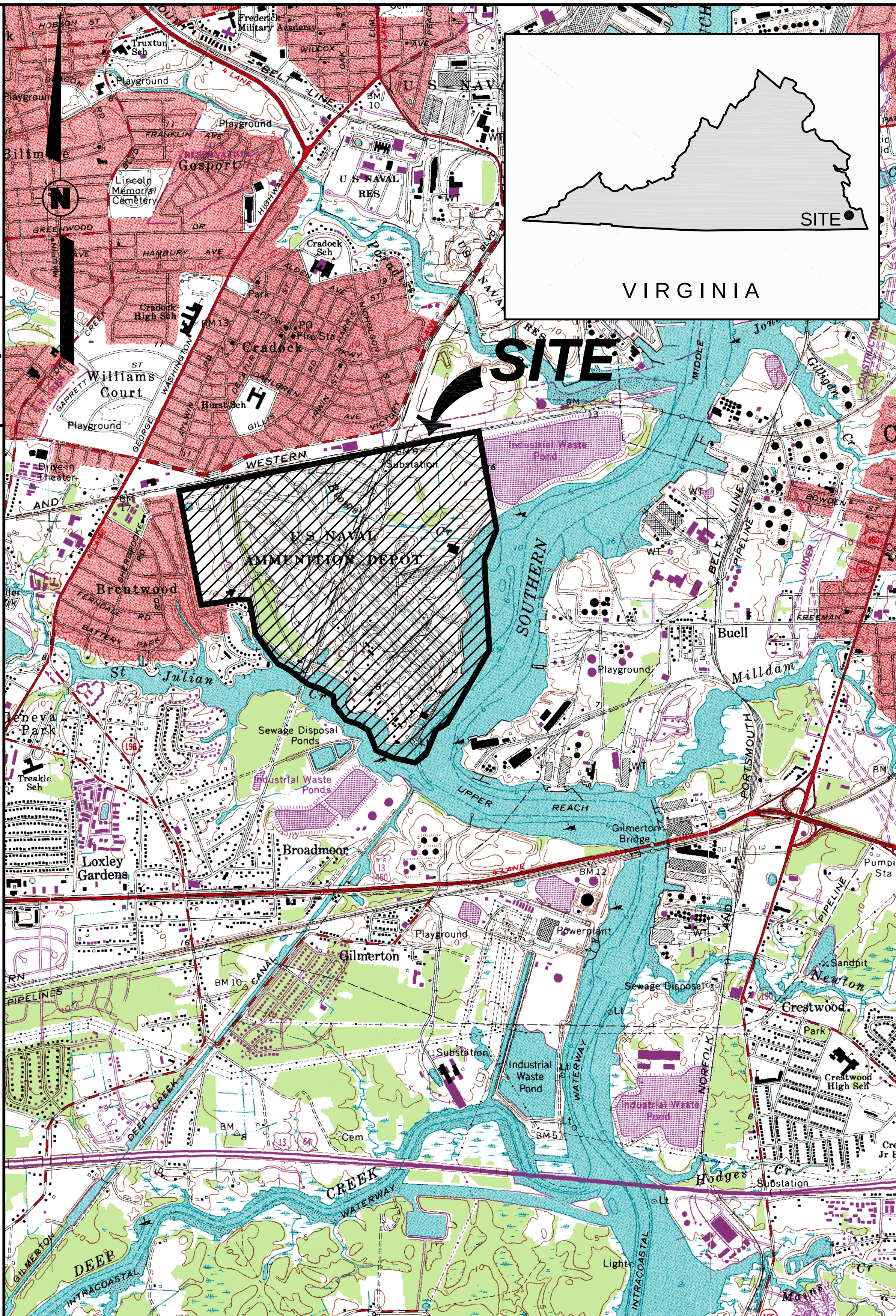
Of the necessary response actions three Site areas are to be addressed under this work plan. These are:

1.1.1 IR Site 3

Site 3 (disposal area) is located in the northeastern corner of the SJCA. Intrusive investigations conducted as part of a Remedial Investigation (RI) show that the extent of waste at Site 3 consists of a central disposal area, and outlying “hot spots” defined during previous site investigations. The Site 3 area was originally a mudflat where refuse was dumped and allowed to burn. The ash was then used to fill in the area. The disposal area is unlined. Operation began in 1940 and continued until 1970. After 1970, the disposal area was graded level and covered with grass in 2001. Review of historical aerial photographs, interpreted by USEPA’s Environmental Photographic Interpretation Center, indicate that prior to use as a disposal area, the site, and much of the adjacent area, had been used for disposal of dredge spoil material (USEPA, 1995). Refuse disposed at Site 3 (disposal area) reportedly included solvents, acids, bases, and mixed municipal waste. The total volume of solvents, waste oil, and oil sludge disposed was estimated to be about 750,000 cubic feet (ft^3) prior to burning. Salvageable materials were removed from the site each day, and once every two weeks the site was bulldozed for compaction and leveling.

Two pits at Site 3 were reportedly used for disposal of oil and oily sludge, as well as for periodic burning. The locations of the waste disposal pit and waste disposal area were outlined based on historical aerial photographs taken in 1958, 1961, 1964 and 1970 interpreted by USEPA

OFFICE	DRAWING NUMBER
Pittsburgh, PA	836067-A2



REFERENCE:

U.S.G.S. 7.5 MIN TOPOGRAPHIC MAP OF NORFOLF SOUTH VIGINIA, DATED 1965, PHOTOREVISED 1986, SCALE: 1" = 1/2 MILE.

S C A L E

0 .5 1 Mile

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

REVISIONS

OHM Remediation Services Corp.

PROJECT NO. 838067

DESIGNED BY	TS	8/2/02	CHECKED BY	P. Verma	8/2/02
DRAWN BY	TFR/LDB	8/2/02	APPROVED BY	J. Sloss	8/2/02

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NORFOLK, VIRGINIA

NAVAL STATION
ST. JULIAN'S CREEK ANNEX
CHESAPEAKE, VIRGINIA

REMEDIAL ACTION
SITES 3, 6, AND 7

SITE LOCATION MAP

SCALE: AS SHOWN | SIZE: A

DELIVERY ORDER NO. 085

CONSTR. CONTRACT NO. N62470-97-D-5000

NAVFAC DRAWING NO.

FIGURE 1

(USEPA, 1995). As identified in the photographs, the disposal pits were located along the north side of the dirt road that crosses the site diagonally. USEPA also interpreted ground scarring along the road to be possible waste disposal areas (CDM, 1999). Site 3 was investigated during the summer of 2001 to determine approximate extent of the former disposal area. The estimated areas requiring excavation were identified during this investigation and are presented on **Figure 2**. It is expected that remnants of UXO scrap burned/flashed at Site 6 could be buried at Site 3, thus UXO construction support screening procedures will need to be implemented.

1.1.2 IR Site 6

Installation Restoration Site 6 (The Small Arms Pit, also called the Caged Pit) was operated as part of the ordnance disposal operations at the Annex. A review of historical aerial photographs during Phase III of the RI indicated that activities associated with Site 6 began around 1974. According to the Resource Conservation and Recovery Act (RCRA) Facilities Assessment (RFA) report, small items, such as igniters and fuses, were regularly burned in the pit. The small arms cage was used to capture any munitions fragments that might be propelled when ignition of fuses or munitions occurred in the burn pit. The 1989 RFA also reported that the Navy had filled in the pit "during recent years". Currently, there is no surface evidence of the Caged Pit at Site 6, and the area is covered with grass. However, geophysical surveys indicate that the metal container may be present below the surface of Site 6. Site 6 was investigated during the summer of 2001 to determine approximate extent of the former disposal area. The estimated area requiring excavation was delineated during this investigation and was limited to one small area. If remnants of the former cage can be identified, they will be excavated and removed.

1.1.3 Site 7

Installation Restoration Site 7 (The Old Storage Yard) consists of a fenced, outdoor grassy area used to store a variety of materials including anchors, hydraulic oil, lubricating oil, lead paint, open drums of sand blast grit, and ship equipment. The startup date for the site is unknown. Site 7 was investigated during the summer of 2001 to determine the nature and extent of contamination. The Navy, USEPA, and Virginia Department of Environmental Quality (VDEQ) project managers made a risk management decision, based on available information, to remove the visible debris from the area. It is expected that most if not all of this debris will be non - hazardous waste and much of it potentially recyclable.

1.1.4 Site 1

Site 1 is located adjacent and immediately northwest of Site 7. Site 1 was used as a disposal area from 1921 to 1924. The area approximately 1 acre in size was reported in the RFA (Kearney and

Brown, 1989) as being used for the disposal of trash and garbage. During the IAS (Navy, 1981), no evidence of environmental contamination was noted. As part of the Hazard Ranking Scoring field investigation conducted by Tetra Tech in 2000 samples were collected in the vicinity. Further evaluations and risk characterizations for the site were performed in 1996 and 2001. As part of the Human Health Risk Assessment a determination was made in that the extent of the waste at the site area is not completely known and further study is going to be required. As part of the additional work to be done, under this action, three test pits are to be dug at Site 1 and the subsurface conditions documented.

1.2 WORK PLAN ORGANIZATION

This work plan is organized into 11 sections. *Sections 1 through 3* provide general introduction, objectives, scope, cost-tracking information, details on pre remedial activities and the preconstruction meeting. *Sections 4 through 6* discuss the construction and remedial steps to be taken to accomplish the work. *Sections 7 through 11* present quality control and project management requirements including waste-management, spill prevention, quality and environmental sampling, and the post construction completion report and a project management plan.

Attached appendices will include separate yet contributory plans:

Appendix A - Site Specific Project Health and Safety Plan
Appendix B - Field Sampling Plan
Appendix C - Construction Quality Control Plan
Appendix D - Erosion and Sedimentation Control Plan
Appendix E - UXO Construction Support and Management Plan

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Plot Date/Time: 08/07/02 10:55am   Image: .
Plotted by: SMITH_A   Xref: aerial

OFFICE	DRAWING NUMBER	838067-A3
Pittsburgh, PA		

SCALE
0 1000 2000 FEET

DEPARTMENT OF THE NAVY   NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION   NORFOLK, VIRGINIA
ST. JULIAN'S CREEK ANNEX   CHESAPEAKE, VIRGINIA

REMEDIAL ACTION
SITES 3, 6, AND 7

St. JULIANS CREEK ANNEX PROPERTY BOUNDARY

OHM Remediation Services Corp.
PROJECT NO. 838067

DESIGNED BY	JS	8/2/02	CHECKED BY	P. Verma	8/2/02
DRAWN BY	LDB	8/2/02	APPROVED BY	J. Sloss	8/2/02

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

REVISIONS

SCALE: AS SHOWN
SIZE: A
DELIVERY ORDER NO. 085
CONSTR. CONTRACT NO. N62470-97-D-5000
NAVFAC DRAWING NO.

FIGURE 2

2.0 OBJECTIVES AND GENERAL SCOPE OF WORK

The objective of the work plan is to outline and describe the specific discrete work elements necessary to accomplish the removal action and provide for as a guidance document in the execution of the removal action.

2.1 COST TRACKING AND CHARGE CODES

Project costs will be tracked against the charge codes established in negotiated contract modification unless approved otherwise by the project manager. Each separate work element (task) has an associated work breakdown structure (WBS) cost charge code associated with it. Separation of each individual WBS code and cost are charged to and tracked as the work occurs. At each month end for each WBS, all accumulative cost and charges will be compiled and reported, tracking the original budget and any approved changes as the project progresses. OHM/SHAW maintains a website for each project that provides a monthly progress report with specific financial information. The website address is: http:\\www.navy-itcorp.com. The following is a task breakdown and description by charge code:

01000010 Preconstruction and Mutual Understanding meeting.

This represents the conference "Mutual Understanding Meeting" to be conducted with Shaw's Deputy Program Manager, Project Manager and Superintendent with LANTDIV personnel prior to mobilization to discuss and finalize procedures, Health and Safety, and other procedures that may be implemented during this project. Labor hours include travel time and the meeting is expected to be local (Portsmouth).

01001000 Mob Construction Equipment

This task is for mobilization of construction equipment to the site needed as part of the site set up and overall general mobilization.

01004000 Site Preparation

This task provides the necessary labor materials and equipment to set up the on-site construction trailer, set up the laydown/pick area for sites 7, 3 and 6, install necessary erosion and sediment control devices, and install set up construction type barrier fencing at site 7 and to start construction equipment materials decon area.

08013000 Site 3 Setup

This work element is for the site specific set up surrounding the excavation area at Site 6 including erosion and sediment control devices, demarcation of the construction work exclusion zones and set up of the power screening equipment and materials handling areas.

08013010 Site 3 Excavation

This facet of the work structure encompasses surveying initially the Site 3 area to grid and provide areal basis of sampling for the area to be excavated. Included are the excavation and UXO screening of 2,200 cubic yards of soil and debris, on going 5-point confirmatory soil sampling, removal of 100 ft of gravel road and transport and disposal of excavated material. An electric duct bank runs through the excavation area which will be marked and carefully worked around. The cost estimated for this task does not include the management of large energetic UXO or the disposal of UXO scrap and fragments removed by power screening. Segregation of OE scrap and UXO will be accomplished. The segregation and classification of this material will determine which waste stream will be pursued for disposal. It is assumed that no energetic UXO will be encountered. Spent UXO or OE determined as inert and classified in accordance with the UXO Construction Support Plans (**Appendix E**) will be disposed of through the St. Julians DRMO.

08013030 Site 3 Restoration

Work under this task is for the replacement of excavated material with clean fill, replace topsoil and seeding of the excavated grassy areas and reconstruction of the 100 feet of gravel road that was removed during the excavation. Additionally, the site construction fencing is removed and the area surrounding the Site 3 work zone is restored to its original condition.

08016000 Site 6 Excavation

This element of work is for the excavation and removal of approximately 60 cubic yards at the Site 6 area. The material will be removed, screened for UXO segregated as necessary and disposed of. Imported clean back fill will replace the removed material and the surface will be restored to its original condition and seeded with grass. The cost estimated for this task does not include the management of large energetic UXO. Similar to Site 3 excavation and segregation of potential OE/UXO, the excavated Site 6 materials will be segregated, managed and disposed of in the same manner (reference **Appendix E** UXO Construction Support Plans).

10907000 Site 7 Debris Removal

This task is for the removal and disposal of items placed across the surface at the Site 7 Area. Metals, scrap discarded generators, miscellaneous tanks, ship rudders, tires, hoses and other materials will be picked up segregated into separate solid waste streams and disposed of or recycled (scrap metal). The former concrete crane counter weights are to be addressed under a separate wbs.

10907010 Site 7 Brush Clearing

In order to achieve the goal of removing the debris placed across Site 7 some brush grubbing is necessary to allow access to equipment and personnel so that the materials can be removed. A minimalist approach will be used to clear out necessary surface vegetation that will then allow access to remove the debris.

10907021 Concrete Anchor (Option B)

This task covers the necessary work efforts, labor, materials and other direct costs associated with breaking up 11 steel clad concrete counter weights and disposing of the debris.

10907030 Site 7 Restoration

This task covers the necessary work efforts necessary to restore the work area and areal extent disturbed by construction to be resurfaced and restored to its original condition.

21004000 Demob Construction Equipment

This element encompasses the labor and cost associated with transport/removal of the construction equipment and personnel from the project site.

21006010 Post Construction Submittal Sites 1, 3, and 7

This task covers the necessary efforts for the compiling, writing and assembly of the draft construction close out report for Sites 1, 3, and 7. It also covers a revision and production of the final report.[1]

21006060 Preparation of Post Construction Submittals Site 6

This task covers the necessary efforts for the compiling, writing and assembly of the draft construction close out report for Site 6.[1]

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[1] OHM/SHAW will do a typical Construction Close-out Report for Sites 1, 3, 6, and 7. CH2M Hill will be collecting information during Site 1, and 6 activities to prepare a regulatory submittal for Site Close out including Risk Assessments.

99001000 Supervision and Management

This wbs covers the necessary labor, materials and efforts necessary for project oversight, management and facilities specific to the project site over the duration of the project.

3.0 PREREMEDIATION ACTIVITIES

3.1 HEALTH AND SAFETY

Safety is of primary importance during all tasks associated with this project. A site-specific Health and Safety Plan (HASP) has been prepared prior to initiation of the work described herein. A copy of the HASP is presented in **Appendix A.** It is the goal of Shaw E&I to prevent all accidents and the philosophy of Shaw E&I that all accidents are preventable.

3.2 PRECONSTRUCTION CONFERENCE

Upon receipt of notice to proceed, and approximately two weeks prior to mobilization to the site a preconstruction conference will be held. The preconstruction conference held prior to the commencement of work is with the NNSY Resident Officer In Charge Of Construction (ROICC) and other Navy and Navy Contractor personnel, as the ROICC deems necessary. The purpose of the meeting will be to discuss the execution of the work and related topics. This meeting is typically conducted by the ROICC.

A tentative agenda for this meeting will typically include the following topics:

- Project Health and Safety
- Construction Team Organization
- Work Timeframe and anticipated schedule
- Security, access restrictions
- Preconstruction Issues
- Construction Issues
- UXO avoidance, clearance, and management planning

3.3 MOBILIZATION

Upon receipt of notice to proceed, the site supervisor will meet with the (ROICC) and appropriate interested activity personnel to discuss and establish the work areas. Factors such as utilities (electrical and water), site access, signing of waste manifests, traffic routes for equipment deliveries and waste removal will also be determined.

Shaw E&I will mobilize personnel, equipment, and resources necessary to complete the project as defined in this Work Plan. Initially, key individuals and equipment will be dispatched to the site to receive trailers and other equipment essential to perform the project. Upon the completion of initial site setup, Shaw E&I will continue mobilization. This will include mobilization of excavation, grading, and hauling equipment, and all other equipment and personnel necessary to complete the project. Support facilities, including sanitation facilities, utility hookups (electrical/ phone) and trash dumpsters, will be delivered to the site if and when they are needed. The project needs and logistics will be coordinated through Shaw E&I's Virginia Beach, Virginia office.

3.4 CONSTRUCTION FACILITIES SETUP

Site setup activities include the various activities that will occur in order to prepare the site for construction operations. The various tasks involved with site setup are described in the following sections. The major setup components are:

- Primary Support Setup
- Site Specific Set Up (Sites 1, 3, 6, and 7)
- Utility Search/ Construction Interference Identification
- Installation of delineation fence
- Installation of Erosion and Sediment Controls
- Dewatering Equipment and Facilities Setup
- Decontamination Facilities Setup
- Haul Road Construction
- Temporary Facilities, Storage/Laydown Area

3.4.1 Primary Support Area Setup

One of the initial activities of site setup is the establishment of a command center for the site. The command center will include an office trailer and a storage trailer, along with their corresponding furniture and office equipment. This activity will also include the connection of power and phone lines by subcontractors. A project sign containing pertinent project and contact information will be posted in the support area. Additional support areas may be constructed at each site location to facilitate site specific activities (e.g. decon stations, UXO exclusion/management areas, portable lavatories, impacted soil staging, etc.).

3.4.2 Site Specific Set Up (Sites 1, 3, 6, and 7)

The varying activities between sites 1, 3, 6, and 7 will require different specific support requirements at each site. Sites 1, 3 and 6 require UXO screening for potential UXO and spent UXO fragments from the former burning operations. Because of the extensive number of anomalies that would be returned during a magnetometer/geophysical survey, the excavated materials will be power screened through a 1-inch screen to separate out any live UXO and spent fragments. Trained UXO technicians will conduct this screening operation. Lexan™ plastic shielding will protect equipment the operators during screening operations. Areas will need to be designated for the staging of UXO screening and investigative equipment, and should live UXO be found that requires detonation, an explosives-magazine or other approved explosives storage may need to be staged onsite if required. The Navy will be responsible for the management of all large energetic UXO should it be confirmed during any site activity. Should large energetic UXO be encountered, all work in the area will cease immediately, and the ROICC notified so that the Navy's mobile EOD team can come and perform the required inerting. The onsite technicians will evaluate any recovered UXO, ordnance scrap, fragments, etc. They will be trained in the management procedures for small UXO (e.g. bullets), which is the most likely UXO material to be present if it remains. Fuses, igniters, large unexploded rounds, grenades, or any other potentially highly energetic/dangerous materials will be managed by the Navy's mobile EOD team. There is no cost included in this scope of work to manage energetic UXO should it be found. The management and disposal of all spent UXO, ordinance scrap or fragments will be handled in accordance with procedures in the UXO Construction Support and Management Plan **Appendix E**. Disposal of certified inert OE will be performed within the provisions outlined in **Appendix E**. It is anticipated that this disposal will be through DRMO St. Julians.

Each Site will have it's own designated exclusion areas. When excavated soil requires intermediate stockpiling prior to load-out, the staging areas will be as close to each site as practical. Erosion and contamination control measures will be implemented at each site based on the specific activities required. A single heavy equipment decon station will be conveniently located to service the activities at all three sites.

3.4.3 Utility Search/Construction Interference Identification

The excavation limits will be clearly marked on the ground and the area surrounding the work area will be surveyed for utilities to be sure that are no obvious underground lines, overhead clearance issues or other obstructions to the work area. In some areas, UXO screening and possibly clearance may need to be conducted before a utility search/mark out can be performed. Shaw E&I will request a utility mark out from the NNSY ROICC, Miss Utility of Virginia, and utilize the services of a private utility locating service as approved by the ROICC prior to beginning ground disturbance activities. A field inspection to verify the locations and depths of utilities will be conducted to prepare the site areas for construction operations. All utilities will be adequately marked and protected before the commencement of any earth disturbing activities. It is not anticipated that any above or belowground utilities will require relocation due to the proposed remedial action. Prior to excavation activities, exclusion and decontamination zones will be established around and proximal to the planned work areas, by marking the areas with orange safety fencing and or flagging as required as approved by the ROICC. Only personnel who have received proper health and safety training will be allowed to enter the exclusion zone. A sign in/out sheet will be located at the site. Under circumstances that warrant further investigation for determining location of utilities, a private contractor may also be utilized for specific scanning of the site with electromagnetic equipment or other geophysical survey instrumentation as approved by the ROICC.

3.4.4 Installation of Delineation Fence

Areas to be excavated, exclusion zones, stockpiles of materials, etc. will be delineated/identified using high visibility plastic construction/snow fence material.

3.4.5 Installation of Erosion and Sediment Controls

Various erosion and sedimentation (E&S) controls will be used during earthmoving activities at the site. All controls will comply with the manufacturer's installation specifications, good engineering practice, and will be installed as in accordance with the Erosion and Sedimentation Control Plan (ESCP). Sedimentation and erosion measures are subject to approval by ROICC. All E&S controls will remain in place until vegetation is reestablished and authorization to remove them is obtained. Sedimentation and erosion control measures will be implemented specifically at each site area dependent on the nature of the activities, the areal extent of the anticipated disturbance, and proximity to surrounding features that may be impacted.

The installation of E&S control measures will allow the soil cover layer and site grading activities to take place while minimizing any threat to the adjacent waterways. Work covered under this task includes the installation of silt fence, straw bales, stabilized construction entrances, and seeding.

Silt fence will be installed at the locations shown on the Erosion Control Plan as shown on **Figure 1A and 1B** in **Appendix D** and wherever deemed necessary by the Site Superintendent. Silt fence installation details are shown on **Figure 2** in **Appendix D**. Silt fence will serve to prevent sediment from leaving the site. The silt fence will capture sediment that is transported by overland storm water flow, before reaching a waterway or sensitive area. Further, excavation would be performed in a manner that minimizes amount of exposed area. The silt fence (and other erosion control measures) will be installed in accordance with *Section 3.05* of the Virginia Erosion and Sediment Control Handbook. The silt fence will be inspected weekly and after each rain event for undermining, deterioration, and accumulation of sediment. Sediment will be removed and disposed if it causes bulging of the geotextile or accumulates to half the height of the silt fence. It will remain in place until the vegetation is established within the area it protects and approval for removal is obtained.

In addition to silt fence, straw bales will be used as necessary to collect sediment and prevent it from leaving the construction site and to decrease the velocity of sheet flow. They will be installed in accordance with *Section 3.04* of the Virginia Erosion and Sediment Control Handbook. Straw bales will be entrenched a minimum of 4 inches and backfilled and staked into the ground. Each bale will be anchored by at least 2 stakes driven a minimum 18 inches deep into the ground. Straw bales will be inspected immediately after each rainfall and at least daily during prolonged rainfall. Sediments will be removed when the level of deposition reaches approximately one-half the height of the barrier.

Stone construction entrances will be installed at points of vehicular ingress and egress as shown on **Figure 1A and 2** in **Appendix D**. They will reduce the amount of soil transported onto paved public roads by motor vehicles or runoff and also minimize dust. Stone construction entrances consist of a stone pad with a filter fabric under liner. They will be installed in accordance with *Section 3.02* of the Virginia Erosion and Sediment Control Handbook. The construction entrances will be inspected regularly throughout the day and maintained as necessary. They may require periodic dressing with additional stone or the washing or reworking of existing stone.

3.4.6 Dewatering

The need for dewatering of excavations is not expected and not included in the original cost estimate or scope of work. Excavations will only reach a minimal depth (four to five feet) and will be well above the water table. Should an accumulation of water occur as a result of rainfall, the excavation will be allowed to naturally drain until working conditions allow continued removal.

3.4.7 Decontamination Facilities Setup

An equipment decontamination pad will be constructed at the location shown on **Figure 1A**. The details for the decontamination pad are found on **Figure 2** in **Appendix D**. All equipment as necessary will be decontaminated at this location prior to leaving the site. Decontamination will be accomplished using a high-pressure washer or steam cleaner.

3.4.8 Haul Road Construction

Shaw E&I will construct/improve haul roads from each Site area as necessary to allow access and passage of heavy equipment and load-out truck traffic to the base patrol road. As noted above, any entrance onto a public right of way will be improved with a stone sediment trap. Over the road trucks will be loaded from stockpiles outside of exclusion zones so that contamination will not be spread over public roadways from tires. Trucks will be inspected after load-out for spilled material on the outside body area. This material will be removed manually. Any load sent over the road will be fully covered.

3.4.9 Temporary Facilities, Storage/Laydown Area

Portable toilet, equipment, support, and office trailers will be mobilized to the site. Since most of the work activity involves excavation without treatment, the need to stage large amounts of materials will be minimal. Material storage areas will be established at convenient/practical locations on the sites. These areas will be located such that deliveries can easily be made and proper safe distances are maintained between traffic and work areas, minimizing interference and the potential for accident. The use of explosives if required for UXO abatement will be covered in the UXO Avoidance and Management Plan in **Appendix E**.

3.4.10 Identification and Demarcation of Excavation Areas

The general Site Areas for the proposed scope of work are known. Sites 1, 3 and 6 require UXO Screening and Avoidance measures to be implemented. Site 7 requires debris removal no test pit excavation will be done at Site 7. **Figure 1A** (**Appendix D**) depicts the area of Site 3 to be excavated. **Figure 1A** also depicts the area of site 6 to be excavated. **Figure 2** shows where Site 1 is located.

Following an initial UXO avoidance survey, the areas to be excavated at Sites 3 and 6 will be marked out using a combination as appropriate surveyors stakes, ground paint, visibility tape, and visibility fencing. These areas may also be subdivided and gridded for the purpose of systematically advancing and tracking excavation progress. Investigation for potential UXO anomalies will conducted in accordance with the UXO Construction Support and Management Plan in **Appendix E**. Exclusion and decontamination zones will also be marked and access restricted to the work zones through the use of high visibility fencing or other means. The delineation of areas to be excavated will be made/confirmed both visually and using the previous characterization report data that is available for the site.

The surface debris to be removed from Site 7 is visually apparent. After the removal of the surface debris at Site 7, Site 1 will be walked with representatives from CH2M Hill to determine the exact locations for three test pits to be dug. The locations of the test pits at Site 1 will be confirmed and marked using surveyor's takes, barrier tape, or ground paint. During the excavation of the test pits a descriptive log and photographic record will be kept of the location and nature of the excavations. After back filling and site restoration, the location of closed test pits will be related back to a coordinate map and markers places for future reference.

4.0 REMEDIATION ACTIVITIES

Remediation activities are outlined in the Scope of Work. A discussion of the specific requirements for each site area are outlined below:

4.1 SITE 3 REMEDIATION ACTIVITIES

The majority of excavation activity will be performed at Site 3. The June 2002 EE/CA (final CH2M Hill) estimates 9,204 cubic yards for entire removal at Site 3. The work effort scoped in this plan for Site 3 will be limited to an estimated 2,468 cubic yards (3950 tons) due to current funding limits. This material is expected to be largely non-hazardous, but will require disposal at a secure RCRA subtitle D facility (e.g. facility constructed under new standards with liner).

4.1.1 Site Setup

The site will be set up with exclusion zones delineated and temporary facilities as needed (e.g. portable lavatories, equipment trailers, etc.). Site layout will consider construction sequencing so that work can be performed in the most efficient possible manner. Site layout will consider access and traffic patterns for vehicles and equipment, the location of stockpiles, etc.

4.1.2 UXO Screening

All excavated soil from Sites 3 and 6 will be power screened to remove potentially energetic UXO and spent fragments from the former burning operations. Because of the extensive number of anomalies that would be returned during a magnetometer/geophysical survey of the waste disposal areas, the excavated materials will be power screened through a 1-inch screen to separate out any live UXO and spent fragments. Based on historical use of the facility, it is expected that any residual UXO is small. Trained UXO technicians will conduct this screening operation. Lexan™ plastic shielding will protect equipment the operators during screening operations. Areas will need to be designated for the staging of UXO screening and investigative equipment, and should live UXO be found that requires detonation, an explosives-magazine or other approved explosives storage may need to be staged onsite if required. The Navy will be responsible for the management of all large energetic UXO should it be confirmed during any site activity. Should large energetic UXO be encountered, all work in the area will cease immediately, and the ROICC notified so that the Navy's mobile EOD team can come and perform the required inerting. The onsite technicians will evaluate any recovered UXO, ordnance scrap, fragments, etc. They will be trained in the management procedures for small UXO (e.g. bullets), which is the most likely UXO material to be present if it remains. Fuses, igniters, large unexploded rounds, grenades, or any other potentially highly energetic/dangerous materials will be managed by the Navy's mobile EOD team. There is no cost included in this scope of work to manage energetic UXO should it be found. Also, the management and disposal of all spent UXO, ordnance scrap, or fragments will be the responsibility of the Navy. Because of the high hazard involved, the UXO Construction Support and Management Plan in Appendix E governs all site operations.

Visual observations will be made as work progresses to watch for any unusually large or potentially live UXO rounds. As outlined in the UXO Avoidance and Management Plan, excavated materials will be power screened using a 1 inch screen opening to recover any UXO fragments from the former burning operation. Systematic UXO screening and avoidance will continue as the materials are excavated and removed to the stockpile locations. All materials loaded out for final off-site will be 100% screened for UXO to prevent inadvertent unsafe disposal. No recovered UXO will be sent to municipal landfill under any circumstances even if the materials are found to be inert. OE/UXO that is screened segregated and designated as inert will be collected and stockpiled. Subsequent disposal of inert OE debris will be in accordance with **Appendix E** and be turned into the Defense Recycling Management Operations (DRMO).

4.1.3 Excavation Perimeter Limits Determination

Based on previous investigative work, CH2M Hill has confirmed the approximate limits of excavation. **Figure 1A** shows the details from the June 2002 EE/CA with the estimated limits of the site. Following mobilization and the initial UXO screen of the site, the limits outlined on the aerial survey depicted in **Figure 1A** and will be marked out on the ground using surveyors stakes, high visibility tape, high visibility fencing, ground paint, or other unmistakable means. The excavation work will at a minimum proceed to these approximate limits. Excavation will proceed beyond these limits, should visual or other evidence indicate contamination exists beyond the defined extent area.

4.1.4 Excavation Process

Once the perimeter limits are established excavation will proceed in a systematic manner to a depth of approximately 4 feet, at a minimum reaching the defined limits of the site area. As outlined in the UXO Avoidance and Management Plan, systematic UXO screening will continue as the materials are excavated and removed to the stockpile locations. All materials loaded out for disposal off-site will be 100% screened for UXO to prevent inadvertent unsafe disposal.

Because of the extensive number of anomalies that would be returned during a magnetometer/geophysical survey, the excavated materials will be power screened through a 1-inch screen to separate out any live UXO and spent fragments. Trained UXO technicians will conduct this screening operation. Lexan™ plastic shielding will protect equipment the operators during screening operations. Areas will need to be designated for the staging of UXO screening and investigative equipment, and should live UXO be found that requires detonation, an explosives-magazine or other approved explosives storage may need to be staged onsite if required. The Navy will be responsible for the management of all large energetic UXO should it be confirmed during any site activity. Should large energetic UXO be encountered, all work in the area will cease immediately, and the ROICC notified so that the Navy's mobile EOD team can come and perform the required inerting. The onsite technicians will evaluate any recovered UXO, ordnance scrap, fragments, etc. They will be trained in the management procedures for small UXO (e.g. bullets), which is the most likely UXO material to be present if it remains. Fuses, igniters, large unexploded rounds, grenades, or any other potentially highly energetic/dangerous materials will be managed by the Navy's mobile EOD team. There is no cost included in this scope of work to manage energetic UXO should it be found. The UXO Construction Support and Management Plan in **Appendix E** governs all site operations.

4.1.5 Soil Screening Processes

During excavation procedures field x-ray fluorescence (XRF) and PAH test kits will be used to field screen appropriate limits of remediation excavation. Second confirmatory samples are to be collected by CH2M Hill in accordance with the confirmatory sampling plan (**Appendix B**). Samples of soil would then be collected in accordance with the Sampling and Analysis Plan (SAP) and construction QA plan for confirmational laboratory analysis. **Table 1** (Confirmatory Sampling Plan CH2M Hill Project Instructions Appendix B) provides constituent cleanup standards for Site 3 and 6 soils.

4.1.6 Backfill and Site restoration

Restoration will involve activities associated with returning the site to pre-excavation conditions as best as practical in preparation for demobilization. Disturbed areas would be back filled with certified "clean fill" and compacted in lifts with the bulldozer, excavator, or roller compacted. The surface will be covered with clean soil and vegetated with native grasses suitable for preventing surface erosion. Clean backfill, topsoil, and seed will be placed in all disturbed areas. Seed and mulch will be applied to the disturbed areas following topsoil placement. A subcontractor will apply the seed, mulch, and nutrients based on the results of the nutrient testing on the topsoil and the Virginia Erosion and Sediment Control Handbook guidelines. The grass cover and all other erosion control measures will be maintained until the grass has established an effective erosion control barrier. The road crossing the excavation area at Site 3 will be restored to its original condition. A post construction survey will be performed to delineate areas where soil was removed from.

4.2 SITE 6 REMEDIATION ACTIVITIES

CH2M Hill estimates in the June 2002 EE/CA[1], that only approximately 35 cubic yards require excavation from Site 6. **Figure 2** depicts the general location of Site 6. **Figure 1A** in **Appendix D** (Erosion and Sediment Control Plan) depicts Site 6 limits. This material is expected to be largely non-hazardous, but will require disposal at a secure RCRA Subtitle D Facility.

4.2.1 Site Setup

The site will be managed from the much larger scale operation at the adjacent Site 3. Temporary facilities as needed (e.g. portable lavatories, equipment trailers, etc.) will be located in the vicinity of Site 6. The area is small involving just more than 300 square feet. In planning the removal at the site, layout will consider access and traffic patterns for vehicles and equipment and will be integrated to the larger scale operation at Site 3.

4.2.2 UXO Screening

An initial UXO survey will be conducted of the area in accordance with the UXO Construction Support and Management Plan. UXO screening for potential UXO and spent UXO fragments from the former burning operations will be performed on all excavated material. Because of the extensive number of anomalies that would be returned during a magnetometer/geophysical survey, the excavated materials will be power screened through a 1-inch screen to separate out any live UXO and spent fragments. Trained UXO technicians will conduct this screening operation. Lexan™ plastic shielding will protect equipment the operators during screening operations. Areas will need to be designated for the staging of UXO screening and investigative equipment, and should live UXO be found that requires detonation, an explosives-magazine or other approved explosives storage may need to be staged onsite if required. The Navy will be responsible for the management of all large energetic UXO should it be confirmed during any site activity. Should large energetic UXO be encountered, all work in the area will cease immediately, and the ROICC notified so that the Navy's mobile EOD team can come and perform the required inerting. The onsite technicians will evaluate any recovered UXO, ordnance scrap, fragments, etc. They will be trained in the management procedures for small UXO (e.g. bullets), which is the most likely UXO material to be present if it remains at the site. Fuses, igniters, large unexploded rounds, grenades, or any other potentially highly energetic/dangerous materials will be managed by the Navy's mobile EOD team. There is no cost included in this scope of work to manage energetic UXO should it be found. The UXO Construction Support and Management Plan in **Appendix E** governs all site operations. Only

[1] Engineering Evaluation/Cost Analysis (EE/CA) for Sites 3 and 6 St. Julians Creek Annex, Chesapeake Virginia, CH_2Mhill, May 2002.

UXO qualified personnel will be allowed to mitigate potential UXO contamination. Should large energetic UXO be found in the field during excavation, the EOD UXO management team will determine how to manage each confirmed anomaly for assessment, disposal or in place detonation. As outlined in the UXO Construction Support and Management Plan, systematic UXO screening will continue as the materials are excavated and removed to the stockpile locations. All materials loaded out for disposal off-site will be screened 100% for UXO to prevent inadvertent unsafe disposal.

4.2.3 Excavation Perimeter Limits Determination

Based on previous investigative work, CH2M Hill has determined the potential presence f the burn cage. **Figure 1A** in **Appendix D** shows the details from the June 2002 EE/CA indicating the estimated limits of the site. Following mobilization and the initial UXO screen of the site, the limits outlined on the aerial survey in **Figure 1A** in **Appendix D** will be marked out on the ground using surveyors stakes, high visibility tape, high visibility fencing, ground paint, or other unmistakable means. The excavation work will at a minimum proceed to these approximate limits. Excavation will proceed beyond these limits, should visual or other evidence indicate contamination exists beyond the defined extent area. A Magnetometer will be used to try and locate the former steel arms box.

4.2.4 Excavation Process

Once the perimeter limits are established excavation will proceed in a systematic manner to a depth of approximately 4 feet, at a minimum reaching the defined limits of the Site area. As outlined in the UXO Avoidance and Management Plan, systematic UXO screening will continue as the materials are excavated and removed to the stockpile locations. All materials loaded out for disposal off-site will be screened for UXO to prevent inadvertent unsafe disposal.

4.2.5 Confirmation Process

Upon reaching the defined limits, assuming visually clean material is found then confirmatory samples will be taken by CH2M Hill. A magnetometer will be used to confirm the location and if found the complete removal of the former steel arms box will be conducted. Samples of soil would then be collected in accordance with the Sampling and Analysis Plan and construction QA plan for confirmational laboratory analysis. **Table 1** (Appendix B, CH2M Hill Project Instructions) provides constituent cleanup standards for Site 3 and 6 soils.

4.2.6 Backfill and Site restoration

Restoration will involve activities associated with returning the site to pre-excavation conditions as best as practical in preparation for demobilization. Disturbed areas would be back filled with certified clean fill and compacted in lifts with the bulldozer, excavator, or roller compacted. The surface will be covered with clean soil and vegetated with native grasses suitable for preventing surface erosion. Clean backfill, topsoil, and seed will be placed in all disturbed areas. Seed and mulch will be applied to the disturbed areas following topsoil placement. A subcontractor will apply the seed, mulch, and nutrients based on the results of the nutrient testing on the topsoil and the Virginia Erosion and Sediment Control Handbook guidelines. The grass cover and all other erosion control measures will be maintained until the grass has been established as an effective erosion control barrier

4.3 Site 7 Remediation Activities

The scope of work for Site 7 involves removal of surface debris, the most prominent being the larger concrete crane weights.

4.3.1 Site Setup

Temporary facilities as needed (e.g. portable lavatories, equipment trailers, etc.) will be staged. Site layout will consider construction sequencing so that work can be performed in the most efficient possible manner. Site layout will also consider access and traffic patterns for vehicles and equipment, the location of temporary stockpiles, etc.

4.3.2 Metal Debris Removal

The surface area of Site 7 contains various types of debris as noted in the background discussion. The areal extent of Site 7 is shown on **Figure 1B** in **Appendix D**. Since this area was used as a storage yard and may have had other uses over the years, there is a variety of materials requiring removal, recycling or disposal. The surface of the area will be scoured for metallic debris. These materials will be sorted into recyclable and non-recyclable piles and further classified as may be appropriate (e.g. iron, brass, and copper). Shaw E&I will then arrange for disposal or recycling at an approved facility. Materials where a beneficial reuse can be found (e.g. donation to a historical museum), will be managed in a prudent manner with approval of the ROICC. Materials that may be too large to be handled as is will be cut up as required by the receiving facility. Offsite management/disposal at any facility will be reviewed with the ROICC. This material is not expected to be hazardous waste.

4.3.3 Concrete Debris Removal

The surface of the area will be scoured for miscellaneous concrete debris. The most significant items of concrete include eleven large cylindrical crane weights, weighing in excess of an estimated 18,000 pounds each. These concrete materials will be sorted into recyclable and non-recyclable piles and further classified as may be appropriate. Shaw E&I will then arrange for disposal or recycling at an approved facility. The cylindrical concrete weights will be broken up and the concrete contents segregated from their steel jacketing. The steel jacketing material will be disposed of as scrap metal as described in the previous section. The concrete material broken up will be either recycled through a licensed concrete recycler or disposed of as miscellaneous concrete debris (construction debris) classified as non hazardous.

4.3.4 Miscellaneous Debris Removal

Once metallic and concrete debris is removed, any remaining debris will be collected and characterized. Materials that can be recycled will be sorted and disposed as appropriate. Materials that are non-hazardous, but can not be recycled, will be disposed at a secure RCRA Subtitle D landfill. Should containers of liquids be found that could be hazardous or any other materials that might be hazardous, these will be set aside for proper characterization. Materials that may be too large to be handled as is will be cut up or demolished as required by the receiving facility. Offsite management/disposal at any facility will be reviewed with the ROICC. The majority of this material is not expected to be hazardous waste.

4.3.5 Site 1 Test Pitting

Three test pits at Site 1 (adjacent to Site 7) will be excavated in order to better determine subsurface conditions. The location of the test pits will located at the direction of the Navy RPM. Based on the investigative work, a detailed log and photographic record will be assembled to compile a more thorough understanding of the site.

The test pits will be excavated using a standard backhoe with an approximate reach of 15 feet. Each excavation will be made to 4 feet or less below grade. An oversight technician or geologist will make a detailed written and photographic log of the subsurface characteristics and observations made as the excavation is advanced. No personnel will enter the excavation under any circumstances.

Upon completion of each excavation, the material removed will be returned to the excavation and compacted using the backhoe bucket. Due to the expansion of soils from excavation disturbance, excess soil will be spread around the test pit area and appropriately contoured and graded. The limits of the test pit excavation will be marked with heavy-duty stakes.

4.3.6 Site Restoration

Restoration will involve activities associated with returning the site to pre-excavation conditions as best as practical in preparation for demobilization Following debris removal and test pit excavation, the entire site area will be mowed. Areas devoid of vegetation or those areas with unsuitable plant types will be scarified and covered with a native grass mix as appropriate for the site. Where the presence of debris left large or unsightly depressions, back filling or grading will be performed to aesthetically contour the site. Clean backfill, topsoil, and seed will be placed in all disturbed areas. Seed and mulch will be applied to the disturbed areas following topsoil placement. A subcontractor will apply the seed, mulch, and nutrients based on the results of the nutrient testing on the topsoil and the Virginia Erosion and Sediment Control Handbook guidelines. The grass cover and all other erosion control measures will be maintained until the grass has been established as an effective erosion control barrier.

Clean backfill, topsoil, and seed will be placed in all disturbed areas. Seed and mulch will be applied to the disturbed areas following topsoil placement. A subcontractor will apply the seed, mulch, and nutrients based on the results of the nutrient testing on the topsoil and the Virginia Erosion and Sediment Control Handbook guidelines. All temporary E&S structures will remain in place while vegetation is being established at the site

5.0 REMOVAL OF TEMPORARY AND DECONTAMINATION FACILITIES

Temporary facilities including delineation fence, work areas, and stockpiles of excess or waste materials will be removed. Subcontractors will disconnect temporary utilities. Temporary roads and parking areas will be graded to conform to the surrounding contours, or left intact based on the ROICC preference. Seed and mulch will be applied to the disturbed areas. The Site Superintendent will verify that the site is clean and restored to a level acceptable to the ROICC before demobilizing the remaining resources.

The decontamination facility will be decontaminated with high-pressure washers. The decontamination water will be contained characterized and disposed of at an appropiate facility. The decontamination pad will then be demobilized from the site.

6.0 DEMOBILIZATION

As phases of work are completed and equipment becomes unnecessary, equipment will be demobilized. All equipment will be visually inspected for proper decontamination prior to leaving the site. Additional materials not utilized will be removed from site, or stored at the SJCA if the materials can be used for future activities if so directed. Once equipment and temporary facilities have been removed, the remaining personnel will demobilize from the site.

7.0 CONSTRUCTION QUALITY CONTROL

The intent of this section is to provide general guidance to the field construction crew for items that require inspection during field activities. In addition, this section identifies some of the critical items that require spot inspection. **Appendix C** contains the Construction Quality Control Plan for this work effort.

7.1 CONSTRUCTION INSPECTION

Contractor quality control is the means by which Shaw E&I ensures that all construction, including that performed by subcontractors and suppliers, complies with the requirements of the Task Order. Inspection establishes the means by which verification of the quality of the work performed and confirms compliance with specific requirements including the inspection of materials and workmanship before, during, and after each definable feature of work. The controls defined will be adequate to cover all construction. The Quality Control Manager's Representative will make adequate inspections to ensure adherence to the work plan for the following activities.

7.2 TESTING

Requirements of testing are provided in the Field Sampling Plan (FSP) **Appendix B** for this project.

7.3 SUBMITTALS

Project Submittals will be prepared and submitted to the Navy and CH2M Hill (review only) for review and acceptance. Submittals will include analytical laboratory reports and waste manifests.

8.0 WASTE MANAGEMENT PLAN

There are several waste management activities anticipated with this project. The waste streams can be anticipated to be in one of the following two groups:

Hazardous (if determined, not expected in significant quantities)

- Petroleum/solvent contaminated soils (verification of classification to be determined)
- Decontamination water

Non Hazardous

- Debris
  - Metallic
  - Concrete
  - Wood
  - Miscellaneous
- Excavated soils

  Decontamination water

  Spent personal protective clothing

  Trash

8.1 HAZARDOUS WASTES

Existing analytical data and process and site delineation knowledge indicates the likelihood of encountering generating significant amounts of hazardous waste is small. However, if confirmed, generated wastes must be handled in accordance with applicable regulations.

8.2 COLLECTION LABELING AND STORAGE

All waste streams generated during the remedial activities should be properly stored and identified. Table 2 below provides a list of the planned disposition of waste streams generated as a result of project activities.

Table 2 - Disposition of Waste Streams	
Waste Stream	Planned Disposition
Spent personal protective equipment	Store in DOD approved and labeled drums
Decontamination water	Containerize in drums or bulk tanks, (label) characterize and dispose as appropriate
Metallic debris, non hazardous	Sort and stockpile into recyclable and non recyclable - dispose as appropriate
Concrete debris, non hazardous	Sort and stockpile into recyclable and non recyclable - dispose as appropriate
Miscellaneous debris, non hazardous	Dispose as appropriate
Impacted soil, non hazardous	Stockpile and arrange for disposal at secure RCRA subtitle D facility
Impacted soil, hazardous	Characterize, manage as appropriate for specific contaminants under RCRA
UXO, energetic - non-recoverable[1]	Arrange for ordnance disposal team to detonate in place or defuse per DOD protocol (reference **Appendix E**)
UXO, non energetic – recoverable[1]	Recycle or dispose per DOD requirements
Fluids from equipment maintenance (e.g. motor and hydraulic oil, etc.)	Containerize label and recycle or dispose as required

[1] Note Form DD-1348 must be prepared and filled out, signed by verification parties. Appendix E provides blank form and procedures.

8.3 DECONTAMINATION OF EQUIPMENT

All equipment will be decontaminated on site using a variety of methods including high-pressure steam washers, sealable tubs, soap and water, scrub brushes and 5-gallon buckets. The volume of water generated during the described remediation activities may be large. The decon water generated will be primarily a result of cleaning of equipment involved with the treatment process. Generated decontamination water / fluids captured will be temporarily stored on site in a container. Homogenized water within the container, will be tested for parameters specific for characterization and disposal. Upon approval from the ROICC, water will be transported for disposal.

8.4 WASTE SAMPLING

Table 3 below provides waste sampling requirements for this project:

Table 3
Waste Management Sampling and Analytical Requirements
(Detail Analytical Matrix in Table A-1 of Field Sampling Plan Appendix B)

Matrix	Type/Description	Location	Parameter	EPA Method	Frequency Count
Decon water	Profiling for IWTP acceptance	Drums/bulk tanks	As required by receiving facility	As required by receiving facility	1 per container
Recyclable debris (nonhazardous)	Profiling for acceptance	Sorted stock piles or segregated bins	As required by receiving facility	As required by receiving facility	As required by receiving facility
Non-recyclable debris (non-hazardous)	Profiling for acceptance	Stock piles or bins	As required by receiving facility	As required by receiving facility	As required by receiving facility
Spent recovered UXO fragments and casings	Profile for disposal	Sorted bins or drums	As required by receiving facility	As required by receiving facility/DOD protocol	As required by receiving facility/DOD protocol
Excavated soil	Disposal profiling	Stock pile excavation area	As required by receiving facility	As required by receiving facility	1 per 1,000 cy of material

9.0 SPILL PREVENTION

The objective in the event of an oil spill is to prevent the discharge of oil into nearby surface water bodies, or the surrounding environment. The person who detects a spill has the responsibility to report the spill to his supervisor. If a spill is in progress when detected, the person detecting the spill has the additional responsibility of initiating action to stop the spill, if safe to do so and the person is adequately trained and authorized to do so.

Rapid containment is necessary to facilitate recovery. The person detecting a spill if adequately trained and authorized, is responsible for initiating action required to contain the spill if safe to do so. The person's supervisor and the appropriate superintendent should be informed of the spill as soon as conditions permit. If available personnel on duty cannot contain the spill at the time of the spill, the supervisor has the responsibility of arranging for the callout of additional personnel necessary to contain the spill.

There is a potential for a spill during the refueling of equipment, operation. This section describes this activity that may result in a spill and provisions for spill prevention. Activities associated with the refueling of equipment will be conducted in a manner to ensure that product or fuel is not released to the environment. When conducting operations that may result in possible fuel release, the work will proceed in accordance with best management practices to preclude a spill. Provision for spill prevention and control that will be used during the transfer of fuel will include:

- Performing manual level checks in the portable fuel tank prior to refilling.
- Performing manual level checks in the equipment tank prior to refueling.
- Manual transfer of fuel.
- Surveillance monitoring: all tanks checked during refueling operations to ensure that overflow conditions do not occur.
- Use of process controls where feasible.
- Proper lines and berms to prevent migration of contaminants if a spill occurs.
- Immediate availability of spill mitigation equipment (e.g. absorbent materials).
- Notification: immediate notification made to NNSY fire department and then to NNSY personnel, if a spill occurs.

Other provisions and procedures will be discussed with the Navy prior to implementation of the refueling or transfer operations depending on the specific circumstances. The responsible Health and Safety representative to ensure availability of prevention controls will perform daily inspections of the refueling operations during field activities.

10.0 POST CONSTRUCTION ACTIVITIES

Post construction activities include those activities that are necessary to close out and properly document the project.

10.1 DEMOBILIZATION

Primary demobilization activities include:

- Demobilization of construction equipment;
- Demobilization of site personnel;
- Site clean up;
- Removal of all temporary structures, appurtenances and equipment;
- Removal of all disposable items, dumpsters, and portable toilets; and
- ROICC approval and acceptance of site conditions.

Shaw E&I personnel will demobilize from the site upon completion of all site restoration activities and after the demobilization activities listed above are performed. As the construction progresses, mobilization and demobilization of major equipment will occur, as project demands require. Upon completion of the project scope of work a final demobilization will be implemented when it is determined by the project manager to be most practical and cost effective to remove equipment and support facilities from the site. Demobilization would include the removal and return of all rental equipment and facilities (e.g. yellow iron, office trailer, etc.), termination of utility services (e.g. phones, electric), removal of fencing, final site cleanup, trash and waste disposal, and transfer of project record documents to the project management office. After demobilization, some informal site activity may still continue without the high-level field support that was present onsite during construction. Informal site activity may include: follow up sampling/monitoring, watering and care of restored/revegetated areas, follow up inspections or removal of sedimentation/erosion control measures, etc.

10.2 CLOSEOUT CONSTRUCTION REPORT

Within 90 days of the completion of construction activities, a final construction closeout report will be provided to LANTDIV NAVENGFACOM. The final report will provide a chronicle of construction activities, project managers summary of costs, site photographs (when appropriate to document site/as built conditions), lessons learned, and the required confirmational sampling results demonstrating the effectiveness/proper completion of the removal action. A typical outline would be as follows:

1.0 Introduction

11.0 PROJECT MANAGEMENT PLAN

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the Quality Assurance (QA) Management team, which will provide reviews, guidance, and technical advice on project execution issues. Members of this staff will be available on an "as-needed" basis to assist in smooth project execution. The project team consisting of a supervisory, health and safety, technical will support the project manager, and QA/QC staff to ensure that the project is safely executed in compliance with applicable laws, regulations, statutes, and industry codes. Individuals of the project team are responsible for fulfilling appropriate portions of the project QA program, in accordance with assignments made by the project manager. The project manager is responsible for satisfactory completion of the project QA program. The project manager may assign specific responsibilities to the deputy project manager and other members of the project staff.

An organizational chart of the project team is presented in **Appendix C**.

11.1 PROJECT ORGANIZATION

The responsibilities of the key members in the project organization are:

11.1.1 Project Manager – Taylor Sword

The project manager is responsible for the overall direction of this project executed under his supervision. He provides the managerial administrative skills to ensure that resource allocation, planning, execution, and reporting meet contract requirements. He is ultimately accountable for all work activities undertaken on this project. The global quality-related responsibilities of the project manager can include, but are not limited to, the following:

- Organization of the project staff and assignment of responsibilities.
- Understanding of contract and scope of work for a specific project communication to the project staff regarding client requirements and QA practices.
- Identification, documentation, and notification to the client and project staff and QA personnel of changes in the scope of work project documentation and activities.
- Supervision of preparation and approval of project-specific procedures, work plans, and QA project plans.
- Approval of project design bases, design parameters, drawings, and reports.
- Approval of project remedial action/construction methodologies.
- Dissemination of project-related information from the client such as input parameters, and drawings.

- Liaison for communications with the client and subcontractors. Liaison between the project staff and other internal groups.
- Decision of whether or not drawings require independent review.
- Investigation of nonconformances, notification of QA personnel, and implementation of corrective actions.
- Determination of the effect of nonconformance on the project and the appropriateness for reporting such items to the client, and providing appropriate documentation for reporting.
- Determination that changes, revisions, and rework are subject to the same quality control (QC) requirements as the original work.
- Serve as final reviewer prior to release of project information.
- Approve and sign outgoing correspondence.
- Custodian of all project related documents.

The project manager may assign some of these responsibilities to the Site Supervisor, who will remain on site throughout the project field activities.

11.1.2 Site Supervisor – Mark Pisarcik

The site supervisor is responsible for the day-to-day management of this specific delivery order. He will ensure sufficient resource allocations to maintain project schedule and budget. He will provide daily feedback to the project manager on project progress, issues requiring resolution, etc. The quality-related responsibilities of the site supervisor include, but are not limited to, the following:

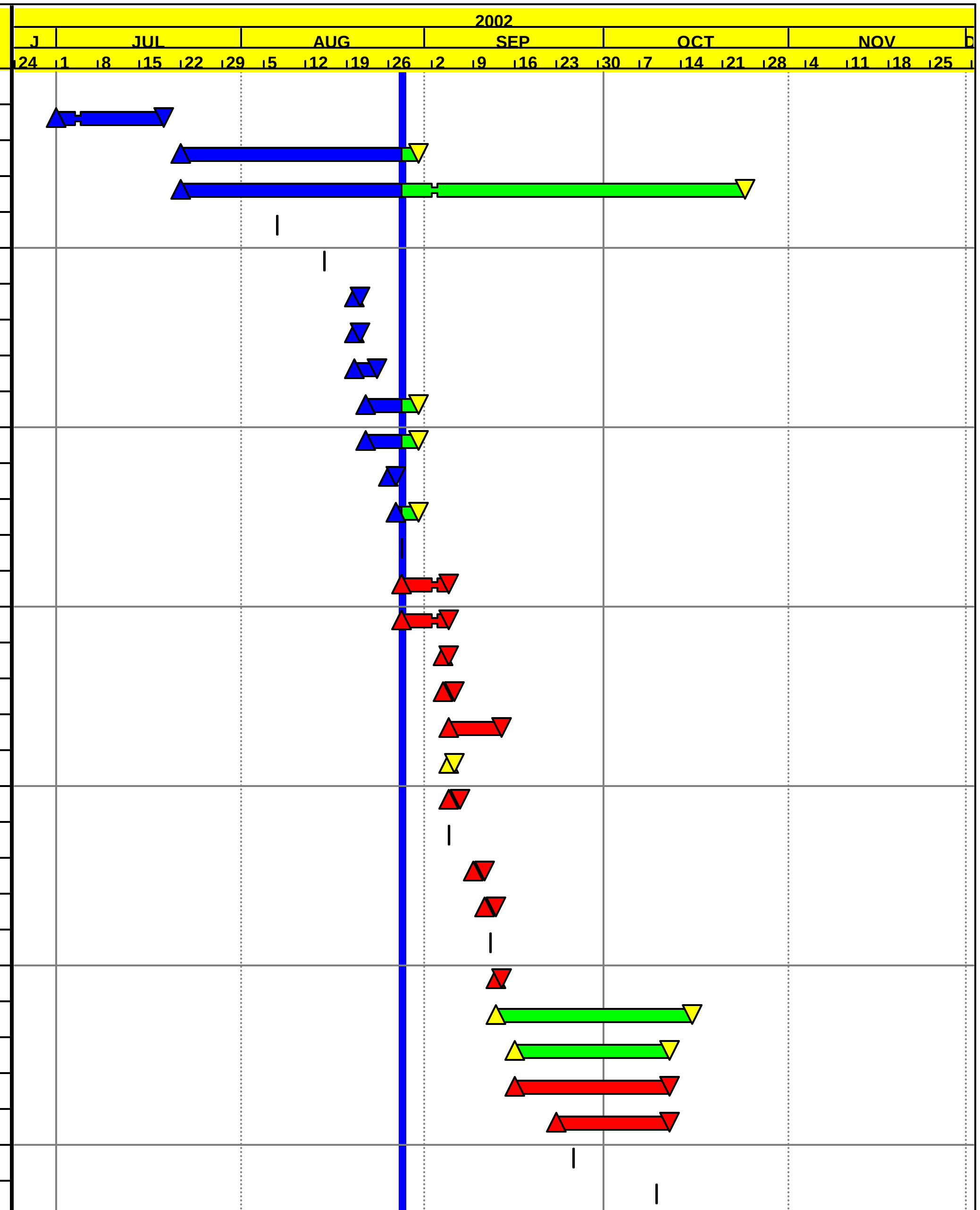
- Notification to the project manager if the project cannot be completed with regard to quality, schedule, or cost.
- Oversight and control of subcontractor services.
- Liaison for communications with Shaw project staff and other internal groups as well as with the Navy Technical Representative (NTR) and on-site inspector.
- Supervision of day-to-day site activities in accordance with project and program requirements.
- Preparing the Contractor Production Report.
- Preparing the Quality Control Reports.
- Initiating corrective actions for non-conformance identified on-site.

11.1.3 Construction QA Officer and Laboratory Coordinator – Natasha Sullivan

The construction QA responsibility is to implement the project chemical QA program. The officer is responsible for informing the project manager of any site-specific QA issues. Where analysis or testing is required, the laboratory coordinating function is responsible for the procurement of a certified laboratory based on the requirements needed for the project. The responsibilities include, but are not limited to, the following:

- Reviewing subcontractor's QA Manuals and/or Laboratory Quality Management Plans (LQMPs) and if possible, performing audits on the labs.
- Certifying the level of QA that has been achieved during the generation of analytical data.
- Initiating and overseeing all audit functions.
- Stopping work if quality objectives are not being met.
- Initiating investigations for nonconformance, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful.
- Selection of qualified laboratories and control of laboratory services requests.
- Assist coordination of laboratory with field sample shipments.
- Management of laboratory data in conjunction with the field chemist.
- Liaison between the field and the laboratories when changes are required in the FSP and Purchase Orders.
- Inspecting and calibrating QA/QC testing instrumentation in use at the site, or providing oversight to others responsible for specialized testing equipment regarding the use and accuracy of any QA/QC field instruments and for instrumentation used by any subcontractors under the projects authority.

Activity ID	Activity Description	% Comp	Orig Dur	Rem Dur	Early Start	Early Finish
01091000	Site Walk	100	1	0	30MAY02A	30MAY02A
01003010	Cost Estimate	100	8	0	01JUL02A	18JUL02A
01031000	Work Plan	70	8	3	22JUL02A	30AUG02
99001000	A&S	1	68*	41*	22JUL02A	24OCT02
01031000A	Work Plan Submittal	100	0	0	07AUG02A	
01031000B	Work Plan Approval	100	0	0	15AUG02A	
01000010	Precon&mutual Mtg	100	1	0	20AUG02A	20AUG02A
01001000	Mobilization	100	1	0	20AUG02A	20AUG02A
01004000	Site Prep/temp Fac.	100	2	0	20AUG02A	23AUG02A
08013010B	Site 3 Sample	0	1	3	22AUG02A	30AUG02
08016000E	Site 6 Sample	0	1	3	22AUG02A	30AUG02
10907010	Site 7 Brush Clear	100	1	0	26AUG02A	26AUG02A
10907000	Site 7 Debris Rmvl	0	3	3	27AUG02A	30AUG02
10907000B	Site 7 CQC Meeting	100	0	0	28AUG02A	
10907021	Conc. Anchor (option B)	0	2	5	28AUG02	04SEP02
10907021A	Concrete Anchor Reef (a)	0	2	5	28AUG02	04SEP02
10907030	Site 7 Restoration	0	1	1	04SEP02	04SEP02
08016000A	Site 6 Set up	0	2	2	04SEP02	05SEP02
08016000	Site 6 Excavation	0	7	7	05SEP02	13SEP02
10907040	Site 7 Test Pits	0	1	1	05SEP02	05SEP02
08016000B	Site 6 Excavate & Screen	0	2	2	05SEP02	06SEP02
10907000C	Site 7 CQC Meeting 2	0	0	0	05SEP02	
08016000C	Site 6 Load T&D	0	2	2	09SEP02	10SEP02
08016000D	Site 6 Backfill & Cleanup	0	2	2	11SEP02	12SEP02
08016000F	Site 6 CQC Meeting	0	0	0	12SEP02	
08013000	Site 3 Setp E&S	0	1	1	13SEP02	13SEP02
21006060	Pst Con Submtl S6	0	23	23	13SEP02	15OCT02
08013010	Site 3 Excavation	0	20*	20*	16SEP02	11OCT02
08013010A	Site 3 Excavation & Screen	0	20	20	16SEP02	11OCT02
08013010C	Site 3 Load T&D	0	15	15	23SEP02	11OCT02
08013010D	Site 3 CQ Meeting 1	0	0	0	26SEP02*	
08013010E	Site 3 CQC Meeting 2	0	0	0	10OCT02*	



Start Date	03DEC01
Finish Date	27NOV02
Data Date	28AUG02
Run Date	28AUG02 12:00

Early Bar

Progress Bar

Critical Activity

TO85

Sheet 1 of 2

Shaw E & I
St. Julians Creek Annex
Sites 3, 6, & 7
Project No. 836067
TO 85

Date	Revision	Checked	Approved

Activity ID	Activity Description	% Comp	Orig Dur	Rem Dur	Early Start	Early Finish
08013030	Site 3 Restoration	0	3	3	14OCT02	16OCT02
08013030A	Site 3 Backfill & Cleanup	0	5	5	14OCT02	18OCT02
21006010	Post Con Submtl 1,3,7	0	30	30	17OCT02	27NOV02
08013010F	Site 3 CQC Meeting 3	0	0	0	17OCT02*	
08013030B	Site 3 Survey	0	1	1	21OCT02	21OCT02
21004000	Demobilization	0	3	3	22OCT02	24OCT02

Appendix A
Site Specific Project Health and Safety Plan

SITE SPECIFIC HEALTH AND SAFETY PLAN
FOR
INTERIM REDMEDIAL ACTION (IRA)
SITES 3, 6, AND 7
ST. JULIENS CREEK ANNEX (SJCA)
CHESAPEAKE, VA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Task Order 0085

Prepared by:

Shaw Environmental and Infrastructure, Inc.
(A member of The Shaw Group Inc.)

Robert Brooks, CSP
Program Health and Safety Manager

Reviewed and Approved by:

Taylor Sword
Project Manger

David Mummert, CIH
Program CIH

July 2002
SHAW E&I Project No. 838067

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List of Acronyms

AHA	Activity Hazard Analyses
BAC	Blood Alcohol Concentration
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
dBA	A-Weighted Decibel
°C	Degrees Celsius
°F	Degrees Fahrenheit
EMA	Emergency Management Agency
EMS	Emergency Response Service
EPA	Environmental Protection Agency
ERCP	Emergency Response Contingency Plan
EV	Electron Volt
EZ	Exclusion Zone
F/B	Flash/Bang
HSM	Health and Safety Manager
IP	Ionization Potential
LEPC	Local Emergency Planning Commission
LEL	Lower Explosive Limit
mg/m^3	Milligrams per cubic meter
Mph	Miles Per Hour
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
NRR	Noise Reduction Rating
O_2	Oxygen
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PM	Project Manager
PPE	Personal Protection Equipment
ppm	Parts Per Million
ROICC	Resident Officer In Charge of Construction
RPM	Resident Program Manager
SS	Site Superintendent
SSHASP	Site-Specific Health and Safety Plan
SSO	Site Safety Officer

TBD	To Be Determined
TLV	Threshold Limit Value
TWA	Time-Weight Average
UV	Ultraviolet

1 INTRODUCTION

1.1 OBJECTIVE

The objective of this plan is to provide a mechanism for establishing safe working conditions during the IRA at Sites 3, 6 and 7, St. Julien's Creek Annex, Chesapeake, Virginia. The safety organization, procedures, and protective equipment have been established based upon a review of the proposed procedures and their potential hazard.

1.2 POLICY STATEMENT

The policy of Shaw Environmental and Infrastructure, Inc. (SHAW E&I), a subsidiary if the SHAW Group Inc., is to provide a safe and healthful work environment for all employees. SHAW E&I considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency and shortcuts. At Shaw E&I, it is believed all accidents and injuries are preventable. Shaw E&I will take every reasonable step to reduce the possibility of injury, illness, or accident.

This Health and Safety Plan (HASP) prescribes the procedures that must be followed during referenced site activities. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager and the Health and Safety Manager.

The provisions of this plan are mandatory for all personnel and subcontractors assigned to the project. All visitors to the work site must abide by the requirements of the plan.

1.3 REFERENCES

This HASP complies with applicable Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), and Shaw E&I Health & Safety policies and procedures. This plan follows the guidelines established in the following:

- Standard Operating Safety Guides, EPA (Publication 9285.1-03, June 1992).
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, EPA (86-116, November 1985).
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.
- Title 29 of the Code of Federal Regulations (CFR), Part 1926.
- SHAW E&I Health & Safety Policies and Procedures (HS001-HS999)

1.4 DISCLAIMER

The following (HASP) has been designed for the methods presently contemplated by Shaw Environmental and Infrastructure, Inc. for execution of the proposed work. Therefore, the HASP may not be appropriate if the work is not performed by or using the methods presently contemplated by SHAW E&I. In addition, as the work is performed, conditions different from those anticipated might be encountered and the HASP may have to be modified. Therefore, Shaw

E&I only makes representations or warranties as to the adequacy of the HASP for currently anticipated activities and conditions.

2 SITE HISTORY/SCOPE OF WORK

2.1 SITE HISTORY/BACKGROUND

Site 3

Site 3 (Landfill C) is located in the northeastern corner of the SJCA. Intrusive investigations conducted as part of a (Remedial Investigation) RI show that the extent of waste at Site 3 consists of a central disposal area, six outlying “hot spots” defined during previous site investigations, and a drainage ditch on the southeastern side of the site. The Site 3 area was originally a mudflat where refuse was dumped and allowed to burn. The ash was then used to fill in the area. The landfill is unlined. Operation began in 1940 and continued until 1970. After 1970, the landfill was graded level and covered with grass in 2001. Review of historical aerial photographs, interpreted by USEPA’s Environmental Photographic Interpretation Center, indicate that prior to use as a landfill, the site, and much of the adjacent area, had been used for disposal of dredge spoil material (USEPA, 1995). Refuse disposed at Site 3 (Landfill C) reportedly included solvents, acids, bases, and mixed municipal waste. The total volume of solvents, waste oil, and oil sludge disposed was estimated to be about 750,000 cubic feet (ft^3) prior to burning. Salvageable materials were removed from the site each day, and once every two weeks the site was bulldozed for compaction and leveling.

Two pits at Site 3 were reportedly used for disposal of oil and oily sludge, as well as for periodic burning. The locations of the waste disposal pit and waste disposal area were outlined based on historical aerial photographs taken in 1958, 1961, 1964 and 1970 interpreted by USEPA (USEPA, 1995). As identified in the photographs, the disposal pits were located along the north side of the dirt road that crosses the site diagonally. USEPA also interpreted ground scarring along the road to be possible waste disposal areas (CDM, 1999). Site 3 was investigated during the summer of 2001 to determine approximate extent of the former disposal area.

Site 6

Installation Restoration Site 6 (The Small Arms Pit, also called the Caged Pit) was operated as part of the ordnance disposal operations at the Annex. It was located northeast of Site 5 (the Burning Grounds) and consisted of a pit with a cage over it. A review of historical aerial photographs during Phase III of the RI indicated that activities associated with Site 6 began around 1974. According to the RCRA Facilities

Assessment (RFA) report, small items, such as igniters and fuses, were burned in the pit. The 1989 RFA also reported that the Navy had filled in the pit "during recent years". Currently, there is no surface evidence of the Caged Pit at Site 6, and the area is covered with grass. However, geophysical surveys indicate that the caged pit is present below the surface of Site 6. Due to its proximity to the Burning Grounds, this site was previously investigated as part of Site 5. Site 6 was investigated during the summer of 2001 to determine approximate extent of the former disposal area. The estimated area requiring excavation was delineated during this investigation and was limited to one small area.

Site 7

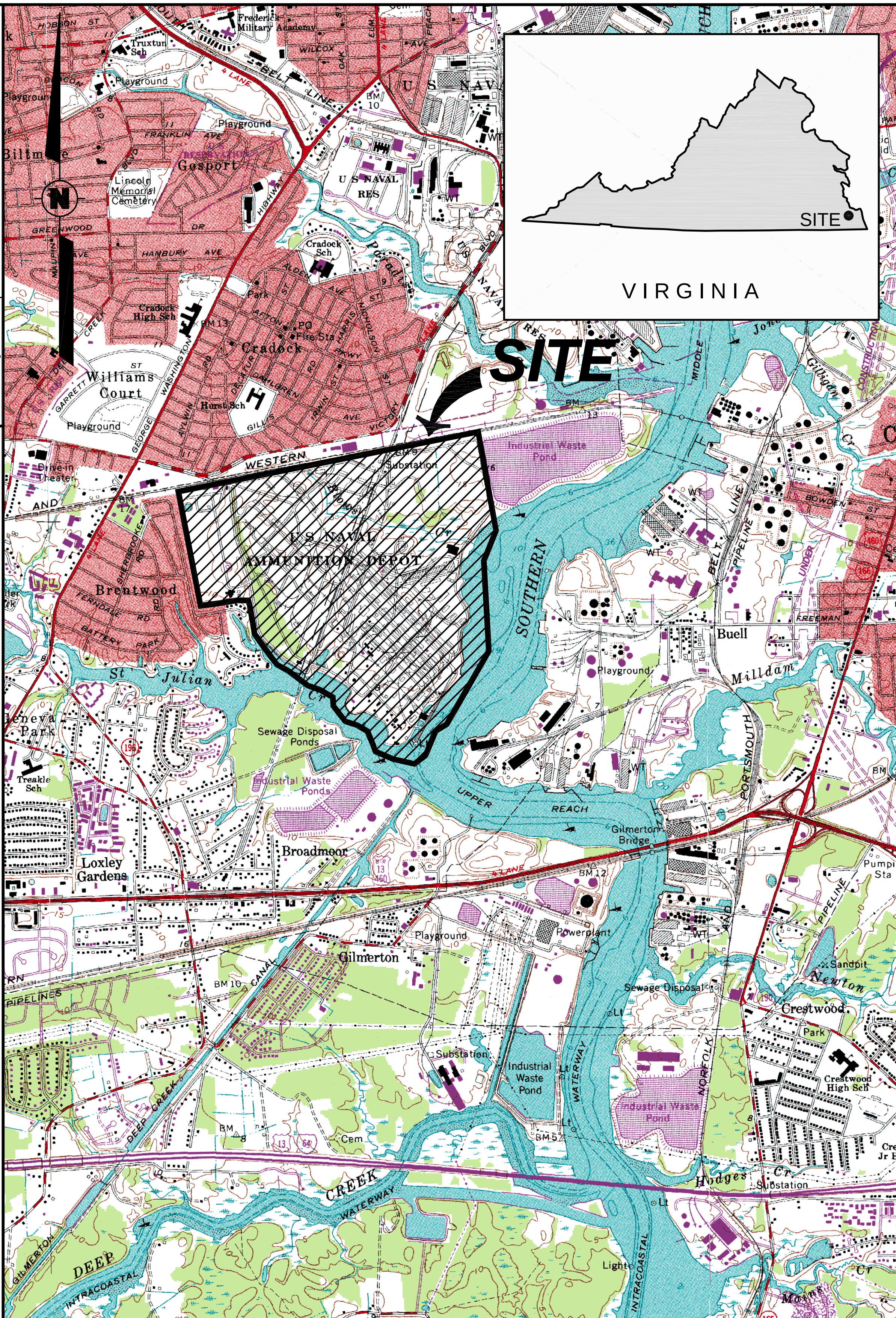
Installation Restoration Site 7 (The Old Storage Yard) consists of a fenced, outdoor grassy area used to store a variety of materials including anchors, hydraulic oil, lubricating oil, lead paint, open drums of sand blast grit, and ship equipment. The startup date for the site is unknown. Site 7 was investigated during the summer of 2001 to determine the nature and extent of contamination. The Navy, EPA, and VDEQ project managers made a risk management decision, based on available information, to remove the visible debris from the area.

2.2 SCOPE OF WORK

This Health and Safety Plan focuses on the remediation activities at Sites 3, 6, and 7. The principal site tasks include the following:

- Site preparation
- Clearing and grubbing
- Excavation and UXO screening sites 3 & 6
- Debris removal site 7
- Breaking up and disposal of 11 steel clad counter weights
- Load out and disposal of surface scrap metal and construction debris
- Equipment decontamination
- Site restoration

Theses activities have been analyzed for potential hazards for which control measures are provided in **Appendix C**.



OFFICE Pittsburgh, PA

DRAWING NUMBER 836067-A2

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Plot Date/Time: 08/07/02 10:58am Image: o36076g3
Plotted by: SMITH_A Xref: .

REVISIONS

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

OHM Remediation Services Corp.

PROJECT NO. 838067

DESIGNED BY	TS	8/2/02	CHECKED BY	P. Verma	8/2/02
DRAWN BY	TFR/LDB	8/2/02	APPROVED BY	J. Sloss	8/2/02

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NORFOLK, VIRGINIA

NAVAL STATION
ST. JULIAN'S CREEK ANNEX
CHESAPEAKE, VIRGINIA

REMEDIAL ACTION
SITES 3, 6, AND 7

SITE LOCATION MAP

REFERENCE:

U.S.G.S. 7.5 MIN TOPOGRAPHIC MAP OF NORFOLF SOUTH VIGINIA, DATED 1965, PHOTOREVISED 1986, SCALE: 1" = 1/2 MILE.

SCALE

0 .5 1 Mile

SCALE: AS SHOWN

SIZE: A

DELIVERY ORDER NO. 085

CONSTR. CONTRACT NO. N62470-97-D-5000

NAVFAC DRAWING NO.

Figure 2-1

3 KEY PERSONNEL AND MANAGEMENT

The Project Manager (PM), Site Supervisor (SS), Site Safety Officer (SSO), and the Program Health and Safety Manager (HSM) are responsible for formulating and enforcing health and safety requirements, and for implementing this HASP. The following summarizes the health and safety responsibilities of the site management.

3.1 PROJECT SAFETY RESPONSIBILITIES

The PM has the overall responsibility for the project and to assure that the requirements of the contract are attained in a manner consistent with the HASP requirements. The SS will coordinate with the SS and the SSO to assure that the work is completed in a manner consistent with the HASP. The PM is responsible for field implementation of the HASP. The SS will be the main contact in any on-site emergency situation and will insure off-site emergency agencies have been contacted prior to the start of work. The HSM and SSO are authorized to administer this HASP. The HSM and SSO are authorized to stop work when an imminent health or safety risk exists. The HSM is responsible for reviewing the HASP and ensuring that the HASP is complete and accurate. The HSM also provides technical and administrative support for the Health and Safety Program and will be available for consultation when required. Each employee is responsible for personal safety as well as the safety of others in the work area.

3.2 KEY SAFETY PERSONNEL

The following individuals share responsibility for health and safety at the site:

Project Manager	Taylor Sword (757) 318-5142 (office)
Site Supervisor	Mark Pisarcik (757) 544-2085 (mobile)
Site Safety and Safety Officer	TBD TBD (site)
ROICC	Peter Gorrell (757) 396-5121 ext. 321
RPM	Dawn Hayes (757) 322-4792
Shaw UXO Specialist	TBD TBD (site)
Program Certified Industrial Hygienist	Dave Mummert, CIH (419) 425-6129 (office)

Program Health and Safety Manager	Robert Brooks, CSP (732) 469-5599 ext. 681 (office) (908) 217-5124 (cellular)
Business Line Lead, Health & Safety	Jerry Joy, CIH, CSP (412) 380-6203 (office)

4 ACTIVITY HAZARD ANALYSIS

This section outlines the potential chemical hazards, which workers may be exposed during site activities. Material Safety Data Sheets (MSDSs) for chemicals which will be brought to the site are included in **Appendix A**.

4.1 CHEMICAL HAZARDS

Hazard information regarding the chemicals associated with the site activities at Sites 3, 6, and 7 are provided below. Prior to the initiation of site activities, a site pre-work health and safety briefing will be conducted with all site personnel and will include an in-depth review of the site contaminants, the associated hazards, personal protective equipment and decontamination procedures.

4.1.1 Chemical Hazards

As discussed in **Section 2.0 Site History**, this area was used as a burn pit for a number of different materials. Soil samples, taken from different depths, indicate a number of compounds are contained in the soil as would be expected from a burn area. These compounds include materials such a polynuclear aromatic hydrocarbons (PAH's) also known as coal tar pitch volatiles, trace amounts of certain pesticides and herbicides in low parts per billion, and various metals, possibly naturally occurring. and again in the low parts per million concentration.

These compounds do not appear to be in sufficient concentrations to adversely affect the health of personnel working in the area as long as normal work precautions are followed. These precautions include not smoking, eating or drinking in the work area; washing before eating, smoking, or drinking once you leave the work area; and avoiding the generation of large amounts of dust.

Table 4.1
Primary Site Contaminants

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Coal Tar Pitch Volatiles	Inhalation, skin or eye contact	0.2 mg/m3	• Dermatis, bronchitis, potential occupational carcinogen

4.2 SPECIAL SITE SPECIFIC HAZARDS

The work at the SJCA is within a restricted area and is potentially hazardous due to the danger from explosive. In addition to the requirements outlined in the Site Specific UXO Support plan, the following restrictions apply, unless a waiver from the SJCA is obtained:

- Liquid petroleum gas and explosives are prohibited.
- Matches and lighters are prohibited in the restricted area. Give matches and lighters to the security personnel at the gate prior to entering the area.
- Obey all roadblocks, signs and gates at entrances to the restricted area.
- Do not operate mobile of fixed transmitters of radio frequency in the restricted area identified

by road signs.

4.3 HAZARD COMMUNICATION

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are transmitted (communicated) according to 29 CFR 1926.59 to all Shaw E&I personnel and Shaw E&I subcontractors. Hazard communication will include:

4.3.1 Container Labeling

Shaw E&I personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.

4.3.2 Material Safety Data Sheets (MSDSs)

There will be an MSDS located on site for each hazardous chemical known to be used on site (i.e. Clorox). All hazardous chemical MSDSs will be located in Appendix A of the SHSP. The site safety plan can be found in the project office trailer.

4.3.3 Employee Information and Training

Training employees on chemical hazards is accomplished through on ongoing corporate training program. Additionally, chemical hazards are communicated to employees through daily safety meetings held at Shaw E&I field projects and by an initial site orientation program.

At a minimum, Shaw E&I and related subcontractor employees will be instructed on the following:

- An in-depth review of the soil and surface contaminants of concern identified above
- OSHA regulated chemicals and their hazards in the work area
- How to prevent exposure to these hazardous chemicals
- What the company has done to prevent workers' exposure to these chemicals
- Procedures to follow if they are exposed to these chemicals.
- How to read and interpret labels and MSDSs for hazardous substances found on SHAW E&I sites
- Emergency spill procedures
- Proper storage and labeling

Before any new hazardous chemical is introduced on site, each Shaw E&I and related subcontractor employee will be given information in the same manner as during the safety class. The PM will be responsible for seeing that the MSDS on the new chemical is available for review by on site personnel. The information pertinent to the chemical hazards will be communicated to project personnel.

Morning safety meetings will be held and the hazardous materials used on site will be discussed. Attendance is mandatory for all on site employees.

Refer to **Appendix A** of the site safety plan to find a list of hazardous chemicals anticipated to be brought to the site and the corresponding MSDSs for these chemicals.

4.4 PHYSICAL HAZARDS

To minimize physical hazards, Shaw E&I has developed standard safety protocols that will be followed at all times. Failure to follow safety protocols will result in removal of an employee from the site and appropriate disciplinary actions.

The SS will observe the general work practices of each crewmember and equipment operator, and enforce safe procedures. The crew leaders and SS will inspect the work areas. All hazards will be corrected in a timely manner. A variety of physical hazards may be encountered during work activities at this site. Activity Hazard Analyses have been developed for each principal activity and identify all major hazards to which employees may be exposed. Hard hats, safety glasses, and steel-toe safety boots are required in all areas where these types of hazards are present. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings.

4.4.1 Exposure to Cold

With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Several forms of cold stress as well as preventative measures are described in this section of the HASP.

4.4.1.1 Cold Stress Conditions and Symptoms

Typical cold stress conditions are included in the tables below, including symptoms and first aid precautions. If cold stress conditions develop, professional medical attention will be sought.

TABLE 4.4.A

COLD WEATHER INJURIES		
CAUSE	**SYMPTOMS**	**FIRST AID**
FROSTBITE		
Freezing of tissue, normally due to exposure below 32°F	Numbness in affected area. Tingling, blistered, swollen or tender areas. Pale, yellowish waxy-looking skin.	Warm affected area with direct body heat. Consult with medical personnel ASAP. **Do not** thaw frozen area if treatment will be delayed. **Do not** massage or rub affected area. **Do not** wet area or rub with snow or ice.
CHILBLAIN		
Repeated exposure of bare skin for prolonged periods to temperatures 20° to 60°F (for those not acclimated to cold weather).	Swollen, red skin. Tender, hot skin, usually accompanied by itching.	Warm affected area with direct body heat. **Do not** massage or rub. **Do not** wet area or rub with snow or ice. **Do not** expose affected area to open fire, stove or any other intense heat source.
IMMERSION FOOT (TRENCH FOOT)		
Prolonged exposure of the feet to wet conditions at temperatures between 32° to 50°F. Inactivity and damp socks (or tightly laced boots that impair circulation) speed onset and severity.	Cold numb feet may progress to hot with shooting pains. Swelling redness and bleeding.	Re-warm feet by exposing them to warm air. Evacuate victim to a medical facility. **Do not** massage, rub, moisten or expose affected area to extreme heat source.

COLD WEATHER INJURIES		
CAUSE	**SYMPTOMS**	**FIRST AID**
DEHYDRATION		
Depletion of body fluids.	Dizziness. Weakness.	Replace lost water. Water should be sipped not gulped. Get medical treatment.
HYPOTHERMIA		
Prolonged cold exposure and body heat loss. May occur at well above freezing, especially when a person is immersed in water.	Lack of shivering. Drowsiness, mental slowness, lack of coordination. Can progress to unconsciousness, irregular heartbeat and death.	Strip off clothing and wrap victim in blankets or a sleeping bag. Get victim to a heated location and medical treatment as soon as possible.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

4.4.1.2 Monitoring and Preventative Actions

Typical cold stress monitoring procedures are included in the tables below, including temperatures to initiate monitoring, protective clothing uses and administrative practices to prevent or reduce the potential for cold stress related injury/illness. For weather conditions below - 43 °C or -45 °F with no wind and/or similar conditions (see Work/Warm-up Table) all work will cease.

TABLE 4.4.B COLD STRESS PREVENTION*

	TEMPERATURE	PREVENTATIVE ACTION
1	<61°F	Use thermometer to measure ambient temperature.
2	<40°F	Cold weather protective clothing available; check core body temperature at breaks using oral or ear canal thermometer. Maintain core body temperature above 96.8°F to avoid hypothermia.
3	<30°F	Record ambient temperature and wind speed every 4 hours; compare to wind chill chart when below 19.4°F.
4	<19°F	Provide and use heated warming shelters for work breaks and when cold stress symptoms appear.
5	<10°F	Constant observation of workers, i.e. "buddy system"; rest in heated shelters (see work-rest schedule); dry clothing available for changeout; acclimate new workers.
6	<0°F/ >5 mph winds	Obtain medical certification for workers subject to hypothermia risk.

* *Based on "1998 ACGIH Threshold Limit Values... for Physical Agents."*
***Note:** refer to wind-chill and work-warm-up charts attached*

TABLE 4.4.C COLD WEATHER CLOTHING

	COLD WEATHER CLOTHING REQUIREMENTS
1	If wind chill is a factor at a work location, the cooling effect of the wind shall be reduced by shielding the work area or providing employees an outer windbreak layer garment.
2	Extremities, ears, toes, and nose shall be protected from extreme cold by protective clothing.
3	Employees performing light work whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.
4	Employees performing moderate to heavy work whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.
5	Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat, or if not possible, a heated shelter for warming/drying clothing, or a change of clothing, shall be provided prior to returning to work in a cold environment.

Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

Employees will be instructed to use heated shelters on site, at regular intervals, depending upon the severity of ambient temperatures. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria necessitate immediate return to the shelter.

TABLE 4.4.D
Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in MPH)	Actual Temperature Reading (F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind Speeds greater than 40 mph have little additional effect.)	***LITTLE DANGER*** In < hr with dry skin. Maximum danger of false sense of security				***INCREASING DANGER*** Danger of freezing of exposed flesh within one minute.				***GREAT DANGER*** Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA. (Shaded area) Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36 C (98.6 F) per cold stress TLV.

TABLE 4.4.E
TLVs Work/Warm-up Schedule for Four-Hour Shift*

Air Temperature -- Sunny Sky		No Noticeable Wind		5 mph wind		10 mph wind		15 mph wind		20 mph wind	
C (appx.)	F (appx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26 to –28	-15 to -19	Normal	1	Normal	1	75 min	2	55 min	3	40 min	4
-29 to –31	-20 to -24	Normal	1	75 min	2	55 min	3	40 min	4	30 min	5
-32 to –34	-25 to -29	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35 to –37	-30 to -34	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38 to –39	-35 to -39	40 min	4	30 min	5	Non-emergency work should cease					
-40 to –42	-40 to -44	30 min	5	Non-emergency work should cease							
≤ -43	≤ -45	Non-emergency work should cease									

*Adapted from Occupational Health and Safety Division, Saskatchewan Department of Labor

4.4.2 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. Heat stress disorders include:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke.

Heat stress prevention is outlined in Shaw E&I Health and Safety procedure HS400, Working in Hot Environments. This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages; e.g., Gatorade. Heat stress can be prevented by assuring an adequate work/rest schedule. Guidelines are presented below and should be used in conjunction with HS400.

In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the SSO and SS. Heat stress can be prevented by assuring an adequate work/rest schedule and adequate fluid consumption. A guide for work/rest schedules for various protection levels are given below in Table 4.2. The number of hours before a work/rest period is based on experience with similar work. The time periods should be considered maximum. It must also be remembered that individual physical variability's and differences in physical work activities may require revisions to site plans. This table should be used as a guide. Professional judgement of the SS and SSO is necessary to assure a fully protective plan to prevent heat stress disorders.

Table 4.4.1
Guidelines For Work-Rest Periods
Protection Level
Number Of Hours Before Rest Period

Temperature	Level D	Level C	Level B	Level A
90+ F*	2.0	1.5	1.0	0.5
87.5 F	2.5	2.0	1.5	1.0
82.5 F	3.0	2.5	2.0	1.5
77.5 F	3.5	3.0	2.5	1.5
72.5	4.0	3.5	2.5	1.5

*Work above 100º F will be reviewed with the Project HSM to determine specific requirements.

Alternately the work/rest schedule can be calculated based on heat stress monitoring results. Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate exceeds 75 percent of their calculated maximum heart rate (MHR = 200 – age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75 percent of their calculated maximum heart rate.

Body temperature, measured orally or through the ear canal, may also be monitored to assess heat stress. Workers should not be permitted to continue work when their body temperature exceeds 100.4 ^{o}F (degrees Fahrenheit) (38 degrees Celsius [^{o}C]). Monitoring should be conducted at the beginning of each break period as noted above.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70 ^{o}F when wearing chemical protective clothing (Level C, B, A), or 80 degrees Fahrenheit for site activities performed with no chemical protective clothing (Level D). Monitoring will include pulse rate, weight loss, oral/ or ear canal temperature, signs and symptoms of heat stress and fluid intake.

4.4.3 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 dBA (Time Weighted Average) as well as personnel working around heavy equipment. The SSO will determine the need and appropriate testing procedures, (i.e., sound level meter and/or dosimeter) for noise measurement.

Noise monitoring should be conducted during the beginning of each activity, as well as, any time modifications lead to increased noise levels e.g. adding additional equipment. A sound level meter will be used to measure noise levels at selected locations in the work area and on the site perimeter when treatment equipment is operating normally. When used, noise monitoring equipment must be calibrated before and after each shift.

If continuous noise levels are found to exceed 85 dBA at any location within the work area, warning signs will be posted. Workers and visitors will be notified that hearing protection is required. Appropriate hearing protection (e.g., ear plugs) will be worn whenever personnel or visitors are working in that location. A supply of ear plugs will be maintained on site.

Action levels in the following table will trigger the use of appropriate hearing protection (plugs or muffs). Hearing protection must be able to attenuate noise below 90 dBA (8 hour TWA). Each hearing protection or device has a Noise Reduction Rating (NRR) assigned by the USEPA. The calculation for a hearing protection device's effectiveness is: Noise reading dBA – (NRR – 7dB) < 90 dBA

Table 4.4.2

Noise

Instrument	Measurement	Action
Type I or Type II Sound Level Meter or dosimeter	>80 dBA → 85 dBA	Hearing protection recommended. Limit work duration to 8-hour shifts.
	>85 dBA → 90 dBA	Hearing protection required. Limit work duration to 8-hour shifts.
	>90 dBA → 115 dBA	Hearing protection required. Investigate use of engineering controls. Limit work duration to 8 hour shifts.
	>115 dBA	Stop work. Consult Project CIH

4.4.4 Biological Hazards

<u>POISON IVY (*Rhus Radicans*)</u>

Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a Tyvek® coverall, to avoid skin contact.

The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

- General symptoms of headache and fever
- Itching
- Redness
- A rash

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24 to 48 hours.

A barrier cream, e.g. Stokogard Outdoor Cream (Stockhousen, Inc. 1-800-334-0242) should be applied to the exposed skin before entering and working in areas with possible poisonous plants.

Distinguishing Features of Poison Ivy Group Plants

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants have greenish-white flowers and berries that grow in clusters.

First Aid

- Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol. 1% hydrocortisone cream (over-the-counter) will aid in healing and reducing itch.
- Apply calamine or other soothing lotion if rash is mild.
- Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

Contaminated Clothing

The irritating substances emitted by poison ivy group plants will remain on clothing for prolonged periods of time - up to weeks or months, if not washed thoroughly. It may be necessary to wash contaminated clothing separately and more than once before reusing.

TICKS

Heavily vegetated areas of a site may have ticks. It is highly recommended that all personnel walking through such areas wear a minimum of a Tyvek® and latex boot covers. The ticks will stand out against the light colors. A tick repellent or insect containing DEET is also recommended.

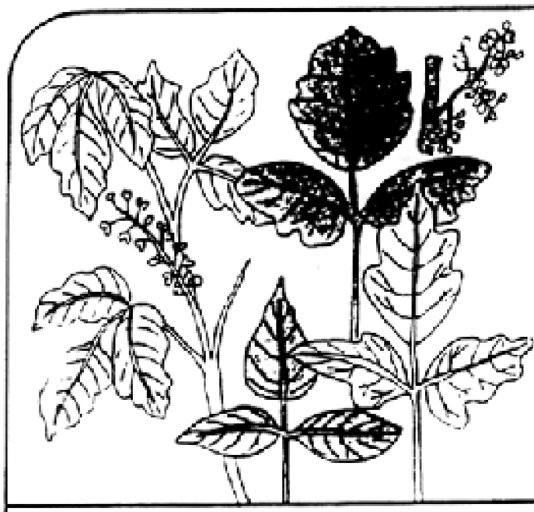
Ticks can transmit several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion, and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater is the chance that it will transmit disease.

First Aid

- Carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed.

- With soap and water, thoroughly, but gently, scrub the area from which the tick has been removed, because disease germs may be present on the skin; also wipe the bite area with an antiseptic.

FIGURE 4.4.1
POISONOUS PLANTS

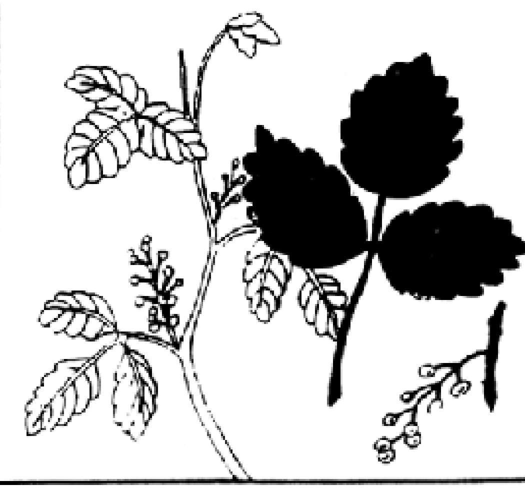


COMMON POISON IVY
(RHUS RADICANS)

- Grows as a small plant, a vine, and a shrub.
- Grows everywhere in the United States except California and parts of adjacent states. Eastern oak leaf poison ivy is one of its varieties.
- Leaves always consist of three glossy leaflets.
- Also known as three-leaf ivy, poison creeper, climbing sumac, poison oak, markweed, picry, and mercury.

WESTERN POISON OAK
(RHUS DIVERSILOBA)

- Grows in shrub and sometimes vine form.
- Grows in California and parts of adjacent states.
- Sometimes called poison ivy, or yeara.
- Leaves always consist of three leaflets.



POISON SUMAC
(RHUS VERNIX)

- Grows as a woody shrub or small tree from 5 to 25 feet tall.
- Grows in most of eastern third of United States.
- Also known as swamp sumac, poison elder, poison ash, poison dogwood, and thunderwood.

If you have been bitten, place the tick in a jar labeled with the date, location of the bite, and the location acquired. If any symptom appears, such as an expanding red rash, contact a physician immediately.

- Report any embedded ticks to your SS and SSO.

LYME DISEASE

Lyme disease may cause a number of medical conditions, including arthritis that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs of Lyme disease rather than see the tick or its bite. This is because the tick is so small (about the size of the head of a common pin or a period on this page and a little larger after they fill with blood), you may miss it or signs of a bite. However, it is also easy to miss the early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and November when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It’s easy to miss the rash and the connection between the rash and the tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes from other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lyme disease, report it to your supervisor and seek medical attention.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell’s Palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can also cause serious but reversible heart problems, such as irregular heartbeat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defense or immune system responds to the infection.

4.4.5 Lightning

The procedures provided below will be used to protect site personnel from lightning related injuries.

Training

A tailgate safety meeting will be conducted to increase awareness to the hazards and prevention of lightning related incidents.

Detection of Lightning

The Project Manager will be proactive in monitoring conditions that may produce thunderstorms and lightning. A daily and weakly weather forecast will be tracked and communicated to site personnel. When signs of impending storms, i.e., increasing wind, darkening skies, or lightening appear, local weather monitoring will be increased. The National Weather Service (www.nws.noaa.gov/) should be consulted frequently. Personnel will be notified when thunderstorms may impact the site.

The "flash/bang" (f/b) technique of measuring the distance to lightning will be reviewed with all personnel. The f/b technique is defined as: for each five seconds from the time of observing the lightning flash to hearing the associated thunder, the lightning is one mile away.

Suspension/Resumption of Activities

All outside activities will be suspended when a lightning flash is immediately in the area or a f/b of 20 seconds (4 miles away) is noted. Personnel may continue indoor work activities. Outdoor activities will resume when 30 minutes has passed since the last observable f/b is 20 seconds or greater.

Lightning Protection

When notification is given, all outside work activities will stop and personnel will gather in the support zone for a head count and further instructions. Indoor work will continue, except for the use of electrical equipment, telephones and computers. When a safe location is not present and personnel are caught by a sudden lightning event, employees should seek the lowest possible area, away from large objects which might attract lightning or fall over, e.g., trees, utility poles. The employee should assume a crouching position with their head lowered and hands over their ears. AVOID: WATER, HIGH GROUNDS, HEAVY EQUIPMENT AND TALL, ISOLATED OBJECTS.

First Aid

An employee that is struck by lightning needs immediate assistance (call 911). The body will not carry an electrical charge, but receives a sever electrical shock and may be burned. Personnel certified in first aid/CPR should inspect for shock and burns around fingers, toes, buckles and jewelry. Stay with the injured employee until medical help arrives.

4.5 VEHICLE AND HEAVY EQUIPMENT SAFETY MANAGEMENT

4.5.1 Vehicle Safety

Motor vehicle incidents are the number one cause of occupational fatalities, accounting for one in three deaths. Fifty percent or more of vehicle safety incidents occur while backing up. SHAW E&I employees involved in the operation and use of Shaw E&I and/or leased or rented vehicles will comply with the ***Shaw E&I Motor Vehicle/Commercial Vehicle Operation and Maintenance Procedures*** (HS800/810). Shaw E&I requires employees to use seat belts at all times when traveling in Shaw E&I owned or leased/rented vehicles. The SS and/or SSO will develop a parking area plan, including backing vehicles into parking spaces, using spotters for backing vehicles and policy mandated vehicle inspections.

Shaw E&I employees are expected to incorporate safe actions and preparations to avoid vehicle accidents and personal injury during work and off-hours. Breaks should be planned into lengthy job mobilizations and demobilizations, including rotation of drivers at regular intervals. If parking areas are busy or crowded and more than one worker is traveling in the same vehicle, one worker should remain outside the vehicle as it leaves the parking space to assist the driver with traffic observation. Vehicles traveling before dawn and at dusk in rural or wooded areas should be prepared to brake for wildlife, e.g. deer crossing roadways.

Shaw E&I employees arriving at work areas should park vehicles away from delivery, heavy equipment and vehicle loading/unloading locations to prevent parked vehicles from damage by various deliveries. Heavy equipment operators should inspect areas and request vehicles to be moved or spotters used if necessary, to maneuver equipment in tight areas. Employees who observe near misses or potential risks to parked or moving vehicles must report these to the SS or SSO immediately.

SHAW E&I employees are expected to use the vehicle inspection form and check/test the safety systems on the vehicle on a daily basis. Check the following: brakes, mirrors, seat belts, tires, leakage from the undercarriage, lights and turn signals. Vehicles with safety deficiencies must be reported immediately and not driven until properly repaired. Vehicles running errands from different project sites should have telephone numbers of the job site in the vehicle in case calls for assistance are required.

Because of the different ways alcohol can affect behavior, even in very small amounts, the best and safest course is not to drink before driving. At Shaw E&I, a driver with blood alcohol concentration (BAC) over 0.04% is considered to be under the influence and subject to disciplinary action. Personnel involved in motor vehicle incidents are subject to drug and alcohol testing.

Weather conditions can have a profound effect on driving. On slippery roads, drive more slowly. Stop and turn with care. Keep several car lengths from other vehicles. At speeds in excess of 35 mph, the chances of hydroplaning increase with speed. In general, keep back 1 car length for every 10 mph to prevent striking the car ahead.

Vehicles will be operated in accordance with the requirements listed below:

- Seatbelt use is mandatory for all passengers;

- Personnel may not ride in the back of cargo vehicles;
- The driver must make a 360 degree walk around the assigned vehicle prior to vehicle movement;
- A ground guide is used to back up any vehicle;
- Vehicle speed is limited to the posted speed limits for developed roadways, 25 mph maximum on dirt roads and 10 mph maximum off-road (based on conditions);
- Vehicle driven in four wheel low and low gear when on dirt roads or off road driving where steep grades dictate;
- All operators must possess a valid drivers license;
- Fuel or gasoline are not transported inside the passenger compartment;
- No vehicle is left running when unattended; and
- Parking brakes are used when vehicles are parked.

In the event of a vehicle incident, notify your Project Manager ***immediately*** and complete all required reports.

4.5.2 Heavy Equipment Safety

Cranes, aerial lifts, forklifts, excavation and other material handling equipment present various physical hazards on remediation sites. The following critical safety practices shall be followed to prevent safety incidents during heavy equipment operation.

- All equipment will be inspected prior to each use.
- All operators will have training or equivalent experience to be permitted to operate heavy equipment.
- Spotters will be used to back-up equipment and direct traffic in all “blind” areas.
- Standard hand signals will be used to communicate between operators and ground crew.
- All heavy equipment will have operable back-up alarms.
- Heavy equipment will be parked in areas where operators will not be exposed to strains or slip/trip/fall hazards during mounting and dismounting of equipment.
- All heavy equipment will be equipped with operable seat belts; belts will be used by all operators.
- Written lifting plans will be developed and reviewed for all critical lifts.

4.6 ACTIVITY HAZARD ANALYSES

Appendix C contains Activity Hazard Analyses (AHA) for primary site task. It contains detailed information on physical and chemical hazards, and provide control measures for these hazards. The AHA will be field checked by the SS and/ or the SSO on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew.

5 WORK AND SUPPORT AREAS

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be clearly identified using signs or physical barriers.

- Exclusion Zone
- Contamination Reduction Zone
- Support Zone

A log of all personnel visiting, entering or working on the site shall be maintained by the SSO.. Visitors will attend a site orientation given by the SSO and sign the HASP.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- Hands and face must be washed upon leaving the main work areas and before eating, drinking, chewing gum or tobacco and smoking.

- A buddy system will be used with the sample team.

- Visual contact will be maintained between buddies on site when performing duties.

- No personnel will be admitted to the site without the proper safety equipment and a review of this health and Safety plan.

- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SS, will be immediately dismissed from the site.

6 PROTECTIVE EQUIPMENT

The PPE outlined has been selected based on the assumption that the only site concerns are trash and debris. If other site contaminants are identified the levels of PPE must be re-evaluated.

6.1 ANTICIPATED PROTECTION LEVELS

The following protection levels have been established for the work activities at Site 12. Changes in the initial PPE levels prescribed in Table 6-1, below require approval for either the CIH or HSM and completion of the HASP amendment form (Appendix E).

Table 6.1
Anticipated Protection Levels

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Site preparation, site restoration	Level D	None	Leatherwork gloves as appropriate.	None	Hard-hat, steel-toe work boots, safety eyewear (safety glasses with side shields or goggles and face shield) and hearing protection >85 dBA
Clearing and Grubbing, Excavation and UXO screening, debris removal, concrete anchor demolition, load-out and disposal of surface scrap metal and construction debris	Modified Level D	Level C	Tyvek® coveralls, latex or rubber over-boots, inner cotton glove liners (based on weather) or inner sample gloves and outer nitrile gloves.	Initial: None Upgrade: Full-face air purifying respirators with multi-contaminant cartridges	Hard-hat, steel-toe work boots, safety glasses and hearing protection >85 dBA
Equipment decontamination	Modified Level D	None	Poly-coated Tyvek® or rain suits, latex or rubber over-boots, inner cotton glove liners (based on weather) or inner sample gloves and outer nitrile gloves.	Full-face air purifying respirators with multi-contaminant cartridges	Hard-hat, steel-toe work boots, full-face shield and hearing protection >85 dBA. Metatarsal and shin guards are required for decon activities.

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
General SZ activities	Level D	None	None	None	Hard-hat, steel-toe work boots, safety glasses, leather work gloves as required for material handling and reflective vests when working in high traffic areas..

6.2 PROTECTION LEVEL DESCRIPTIONS

This section lists the minimum requirements for each protection level. Modification to these requirements may have been noted above.

6.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather
- Leather work gloves as required for material handling
- Reflective vests when working in high traffic areas

6.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields or full-face shield and goggles as required for splash hazards
- Hard hat
- Steel-toed work boots
- Inner work clothing as prescribed by weather
- Leather work gloves as required for material handling
- Inner cotton glove liners (as prescribed by the weather)
- Outer nitrile gloves (Lined nitrile gloves should be used during cold weather)
- Rubber or latex over-boots
- Tyvek® coveralls or Poly-coated Tyvek®, as required to protect against splash hazards

6.2.3 Level C

- Safety glasses with side shields or full-face shield and goggles as required for splash hazards
- Hard hat
- Steel-toed work boots
- Inner work clothing as prescribed by weather
- Leather work gloves as required for material handling
- Inner cotton glove liners (as prescribed by the weather)
- Outer nitrile gloves (Lined nitrile gloves should be used during cold weather)
- Rubber or latex over-boots
- Tyvek® coveralls or Poly-coated Tyvek®, as required to protect against splash hazards
- Full-face air purifying respirator with combination cartridges.

6.3 AIR-PURIFYING RESPIRATORS

If respiratory protection is required, personnel will use a Survivair Opti-Fit respirator. This device is NIOSH approved full-face air purifying respirator. With this unit personnel will use the 1053 organic vapor/acid gas/P-100 cartridge.

6.4 CARTRIDGE CHANGE-OUT SCHEDULE

If the action levels are exceeded as specified in Section 8.1.1 Direct Reading Air Monitoring and respirator protection is required, the project CIH will determine a cartridge change-out schedule in compliance with 29CFR1910.134. At a minimum, all cartridges will be disposed of at the end of each work shift.

6.5 INSPECTION AND CLEANING

Respirators shall be checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after each use.

6.6 FIT TESTING

Annual respirator fit tests are required of all personnel wearing negative-pressure respirators. A qualitative fit test is required.

6.7 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

6.9 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided. Contact lenses are permitted to be used with full-face respirators based on a decision by the Occupational Safety and health Administration (OSHA).

6.10 MEDICAL CERTIFICATION

Only workers who have been certified by a physician, as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees will receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

6.11 SITE SPECIFIC PERSONAL PROTECTIVE EQUIPMENT (PPE) PROGRAM

The primary objective of the PPE program is to ensure employee protection and to prevent employee exposure to site contaminants during site operations. Engineering controls are not feasible for many tasks and, therefore, require the use of PPE.

The SS will be responsible for monitoring all aspects of the PPE program. This includes donning and doffing, temperature related stress monitoring, inspection, and decontamination. PPE selection is identified in Table 6.1 for each specified task. The SS, in consultation with the SSO, and the HSM will direct changes in PPE based on changing conditions. The site specific HASP will serve as written certification that the workplace was evaluated concerning PPE requirements. IT Corporation's comprehensive PPE Program is described in Appendix B.

7 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

7.1 PERSONNEL HYGIENE PROCEDURES

Personal hygiene procedures will ensure that material which workers may have contacted in the work areas do not result in personal exposure and are not spread to clean areas of the site. This sequence describes the general decontamination procedures for Modified Level D

7.1.1 Level D+ Decontamination

1. Go to end of the work area
2. Rinse outer clothing, including boots and gloves
3. Remove boots (discard latex over-boots)
3. Remove outer gloves and discard
4. Remove outer coverall and discard as appropriate
6. Wash face and hands

7.1.2 Level C

1. Go to end of the work area
2. Wash outer boots and stage to let dry; or
b. Remove and discard latex booties
3. Remove outer gloves and discard
4. Remove outer suit and discard
5. Remove outer sample gloves and discard
7. Remove inner suit and discard, (if applicable)
8. Remove and wash respirator (4 stages)
    a. Soap and water solution
    b. First rinse
    c. Disinfect respirator (1 cap full of bleach to 1 gallon of water)
    d. Final rinse
    e. Hang respirator to dry
9. Remove inner sample gloves and discard
10. Wash face and hands

7.1.3 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided as determined by the degree of exposure or injury.

7.1.4 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

7.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the PM.

7.3 DISPOSAL

All decontamination liquids and disposable clothing will be treated as contaminated waste unless determined otherwise by accepted testing methods. Wastes will be disposed of according to state and federal regulations.

8 AIR MONITORING

Air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. Principal contaminants of concern are listed in Section 3.0 of this plan. The target compounds selected for air monitoring purposes at site 3, 6 and 7 are waste oils, solvents, and corrosives. Results of air monitoring will be used to ensure the proper selection of protective clothing and equipment, including respiratory protection, to protect on-site personnel and off-site receptors from exposure to unacceptable levels of site contaminants. Descriptions of air monitoring strategies, procedures and equipment are provided below. Modification of this plan, including additional monitoring, may be considered as judged necessary by the CIH, in conjunction with the HSM and SSO.

8.1 WORK AREA AIR MONITORING

Work area air monitoring at SJCA will include direct reading methods. Air monitoring will be conducted during any work requiring soil or sediment disturbance or water handling. These activities include grubbing, excavation, and debris removal.

8.1.1 Direct Reading Air Monitoring

During work activities direct reading air monitoring will be performed to determine exposure to workers. A PID meter will be used to monitor for toxic vapors. A LEL/O2 meter will be available to test for potential combustible vapors and to check oxygen levels. A Particulate Meter (i.e.: Mini Ram, Data Ram) will be used to monitor for airborne particulates. A summary of air monitoring information is provided in the table below.

Table 8.1.1
Direct Reading Air Monitoring Requirements

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
LEL/O_2	EZ/ Area sampling	Periodically at the discretion of the SSO	>10% LEL <20.8% O_2	Evacuate area, ventilate, upgrade to Level B if necessary, continue to monitor
PID	EZ work area and breathing zone of workers	Periodically at the discretion of the SSO	<1 ppm* 1 ppm 1-10 ppm* (No VC) 10-100 ppm* > 100 ppm*	Modified D Test for vinyl chloride (VC) Modified D Level C Stop work and evaluate.
Mini-Ram (total dust)	EZ work area and breathing zone of workers	Continuous during contaminated soil excavation. Periodic on other site tasks as directed by the SSO	<5 mg/m^3* 5.0 – 15.0 mg/m^3* >15 mg/m^3*	Modified D Level C Stop work and evaluate.

*Sustained levels above background for 5 minutes

8.2 INSTRUMENTATION

The following is a description of the air monitoring equipment to be used at this site.

8.2.1 Lower Explosive Limit/Oxygen (LEL/O_2) Meter

8.2.1.1 Types and Operational Aspects

MSA Watchman LEL/O2 Meter or equivalent

- Principle of Operation

  - Oxygen detector uses an electrochemical sensor; produces a minute electric current proportional to the oxygen content.

  - Combustible gas indicators use a combustion chamber containing a filament that ignites flammable vapors; filament is heated or coated with a catalyst (platinum) to facilitate combustion.

  - Filament is part of a balanced resistor circuit; combustion in the chamber causes the filament temperature to increase; results in increased filament resistance.

- Change in the filament's resistance causes an imbalance in the circuit proportional to the percent of the lower explosive limit (% LEL).

- Concentrations greater than the LEL and lower than the upper explosive limit (UEL) will read 100% LEL; combustible atmosphere present.

- Concentrations greater than the UEL will read above 100% LEL then return to zero. (NOTE: Some devices have catchment mechanisms which will cause the needle to remain at 100% until the meter is reset.) This type of response indicates the gas mixture is too rich to burn and is not combustible. The danger is that the addition of air to the gas mixture could bring it into the flammable range (less than the UEL).

- Oxygen meter set at the factory to alarm at 19.5% (oxygen deficient atmosphere) combustible gas meter set by the user to alarm at 10% LEL.

8.2.1.2 <u>Calibration Methods/Frequencies</u>

Before the calibration of the combustible gas indicator can be checked, the unit must be in operating condition. The combustible gas indicator (LEL) is normally calibrated on pentane as being representative of the flammability characteristics of most commonly encountered combustible gases. The meter scale is calibrated from zero to 100% LEL, which corresponds in actual volume concentrations of 0 to approximately 14% pentane in air. A booklet of response curves is supplied with the Watchman Meter. These curves may be used to interpret meter readings when sampling combustible gases other than pentane.

It is recommended that calibration be checked before and after using each time. The SSO will record and log such calibration information into an air monitoring notebook. The O_2 meter is calibrated by adjusting the O_2 control knob to 20.8% while the meter is operated in a fresh air atmosphere.

8.2.1.3 <u>Preventative Maintenance</u>

The primary maintenance of unit is the rechargeable 2.4 volt nickel cadmium battery. Recommended charging time is 16 hours. It may be left on charge for longer periods without damaging the battery. The battery sometimes will not supply full power capacity after repeated partial use between charging. Therefore, it is recommended that the battery be exercised at least once a month by running for eight to 10 hours and recharged. If the instrument has not been used for 30 days, the battery should be charged prior to use.

8.2.2 Photoionization Detector (PID)

8.2.2.1 <u>Type and Operational Aspects</u>

Photovac PID or equivalent

- Principle of Operation

  - Ionization potential (IP) - The energy required to remove the outermost electron from a molecule; measured in electron volts (eV); characteristic property of a specific chemical.

- Photoionization - Using ultraviolet (UV) light to remove the outermost electron from a molecule.

- Energy of UV light must be equal to or greater than the IP to photoionize the molecule.

- Fan or pump is used to draw air into the detector where the contaminants are exposed to a UV light source (lamp).

- Ions are collected on a charged plate and produce a current directly proportional to the number of ionized molecules; current is amplified and displayed on the meter.

8.2.2.2 Calibration Method/Frequencies

The PID is designed for trace gas analysis in ambient air and is calibrated at Photovac with certified standards of benzene, vinyl chloride, and isobutylene. Other optional calibrations are available (e.g., ammonia, ethylene oxide, H_2S, etc.).

Shaw E&I will use a PID with a 10.2 eV lamp. This lamp has been determined to be most responsive to the contaminants on site. Optional probes containing lamps of 9.5 and 11.7 eV are interchangeable in use within individual read-out assemblies for different applications.

The approximate span settings for the probe that would give different readings of the amounts of trace gas of a particular species in a sample are based upon the relative photoionization sensitivities of various gases twice daily (beginning and end of shift).

It is recommended that calibration be checked twice each day (beginning and end of shift). The SSO will record and log such calibration information into an air monitoring notebook.

8.2.2.3 Preventative Maintenance

Maintenance of the Photovac PID consists of cleaning the lamp and ion chamber, and replacement of the lamp or other component parts or sub-assemblies.

8.2.3 Portable Total Dust Monitor

8.2.3.1 Type and Operational Aspects

Real-Time Aerosol Monitor (Mini Ram Model PDM-3 and Model Pr100 Data Ram)
- Principle of Operation

  - Detection of light in the near infrared region back-scattered to a sensor (photovoltaic detector) by airborne particulate in a sensing volume

  - The higher the dust concentration the more back-scattering of light to the sensor, resulting in increased readings

- Device calibrated at the factory against an air sampling filter/gravimetric analysis reference method

8.2.3.2 Calibration Methods/Frequencies

There is no calibration method or procedure for calibrating the mini-ram monitor. However, it is recommended that the mini-ram monitor be re-zeroed once a week. During a zero check, the sampled air passes through the purge air filter and dryer to effect a self-cleaning of the optical chamber.

8.2.3.3 Preventative Maintenance

Maintenance of the mini-ran consists of replacement of filters and desiccant; battery replacement; and cleaning of the optical detection assembly.

8.3 AIR MONITORING RECORDKEEPING

The SSO will ensure that all air-monitoring data is logged. Data will include instrument used, wind direction, work process, etc. The Shaw E&I Project CIH may periodically review this data.

8.4 CALIBRATION REQUIREMENTS

The PID, LEL/O_2 meter and particulate meters will be calibrated daily before and after use. A log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

8.5 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

9. EMERGENCY RESPONSE

PRE-EMERGENCY PLANNING

Prior to engaging in remediation activities at the site, Shaw E&I will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition site personnel will receive training during the site orientation concerning proper emergency response procedures.

The following situations would warrant implementation of the Emergency Response and Contingency Plan (ERCP):

Table 9.1
Emergency Response Situations

Medical Emergency	• Overexposure to hazardous materials • Trauma injuries (broken bones, severe lacerations/bleeding, burns). • Eye/skin contact with hazardous materials. • Loss of consciousness. • Heat stress (Heat stroke). • Heart attack. • Respiratory failure. • Allergic reaction.
Fire/Explosion	• The potential for human injury exists. • UXO disturbance • The use of water and/or chemical fire suppressants could result in contaminated run-off.
Spill or Release of Hazardous Materials	• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard. • The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.
Natural Disaster	• A rainstorm exceeds the flash flood level. • The facility is in a projected tornado path or a tornado has damaged facility property. • Severe wind gusts are forecasted or have occurred and have caused damage to the facility.

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.

- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.

- It will be the responsibility of the emergency coordinator to brief the on-site response team on anticipated hazards at the site. The emergency coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.

- Emergency response activities will be coordinated with the Local Emergency Management Agency (EMA), Local HAZMAT teams, Fire Department and the Center for Disease Control.

Communications will be established prior to commencement of any site activities. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be two-way radios. Air horns may be used to alert personnel of emergency conditions. A telephone will be located at the command post to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using a cellular telephone if commercial telephone lines are not available.

EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the PM and the Site Safety Officer, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and job safety analyses) to recognize and identify all hazards that are found at the site. These may include:

Chemical Hazards	• Materials at the site • Materials brought to the site
Physical Hazards	• Fire/explosion • Slip/trip/fall • Electrocution • Confined space • IDLH atmospheres • Excessive noise
Mechanical Hazards	• Heavy equipment • Stored energy system • Pinch points • Electrical equipment • Vehicle traffic
Environmental Hazards	• Electrical Storms • High winds • Heavy Rain/Snow • Temperature Extremes (Heat Stress)

Once a hazard has been recognized, the SS and the SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meetings
- Task-specific training prior to commencement of activity
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work and confined space
- Following all Shaw E&I standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills

TABLE 9.2 EMERGENCY TELEPHONE NUMBERS	
Local Agencies – Ambulance Fire Police	 911 911 911
Hospital – Portsmouth Naval Hospital Maryview Medical Center See Appendix D for directions to the hospital.	(757) 953-5000 (757) 398-2200
Regional Poison Control Center	800-282-5846
Federal Agencies Center for Disease Control	 (404) 639-3311
LANTDIV ROICC – Pete Garell RPM – Dawn Hayes	 (757) 396-5121 ext. 321 (757) 322-4792
SHAW E&I Personnel Project Manger – Taylor Sword Site Supervisor – Mark Pisarcik Site Safety Officer-TBD UXO Specialist - TBD Program CIH – Dave Mummert Program Health and Safety Manager –Robert Brooks Business Line H&S Lead– Jerry Joy, CIH, CSP	 (757) 318-5142 (757) 544-2085 (cell) TBD TBD (419) 425-6129(office) (732) 469-5599 Ext 681(office) (412) 380-6203 (office)
SHAW E&I Corporation (24 hour)	800-537-9540

PERSONNEL ROLES, LINES OF AUTHORITY, COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary emergency coordinator for this site is the Project Manager. In the event an emergency occurs and the emergency coordinator is not on site, the SS or the highest-ranking employee on site will serve as the emergency coordinator until he arrives. The emergency coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The emergency coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the emergency coordinator or his designee will evaluate the situation to determine the appropriate action.

Responsibilities and Duties

This section describes the responsibilities and duties assigned to the emergency coordinator. It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. Shaw E&I will follow procedures as directed by the fire department, Local Emergency Planning Commission (LEPC), State and Federal Agencies as required. Shaw E&I will defer to the established Incident Commander (Coast Guard, Fire Dept, etc.) upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

On-Site Emergency Coordinator Duties

The on-site emergency coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the emergency coordinator. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.

- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site.

- Notify local Emergency Response Teams if their help is necessary to control the incident. Table 9.2 provides telephone numbers for emergency assistance.

- Direct on-site personnel to control the incident, if necessary, until outside help arrives.

- Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if appropriate.

- If fire or explosion is involved, notify facility Fire Department.

- Notify Shaw E&I Project Manager

- Notify ROICC

- Have protected personnel, in appropriate PPE, on standby for rescue, if appropriate.

The ROICC will determine if the incident may threaten human health or the environment outside of the site and whether evacuation of area outside of the site may be necessary. The ROICC will notify the Police Department and the Office of Emergency Management, as appropriate to initiate an evacuation of the surrounding area..

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.

- Containers of waste are removed or isolated from the immediate site of the emergency.

- Treatment or storage of the recovered waste or any other material that results from the incident or its control is provided.

- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.

- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.

SAFE DISTANCES AND PLACES OF REFUGE

The emergency coordinator for all activities will be the SS. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies that could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the Shaw E&I office trailer, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the Shaw E&I office trailer until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

Evacuation Signals and Routes

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Upon entry into the facility, the response team will ask the ROICC about the facilities emergency alarms and evacuation procedures.

Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.

- The crew will decontaminate if possible and leave the area as a team.

- The team will coordinate with the ROICC prior to re-entry into the facility

- Re-entry into the site will be made only after the ROICC gives clearance. At his direction, a signal or other notification will be given for re-entry into the facility.

EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 9.1 provide a quick reference guide to follow in the event of a major spill.

Notification Procedures

If a team member discovers a chemical spill, he or she will immediately cordon off the area until a plan of action can be determined. Contact the PM, HSM, and ROICC.

The team will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill/release is heading.
- Any injuries involved.

This information will help the response team and other personnel to assess the magnitude and potential seriousness of the spill or release.

Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. (Refer to Table 9.2)

Response personnel will take the following measures:

- Immediately shut-down operations and equipment if safe to do so.

- Make sure all unnecessary persons are removed from the hazard area and follow the appropriate decontamination procedures.

- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.

- Determine the major components in the waste at the time of the spill.

- If wastes reach a storm sewer, try to dam the outfall.

- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.

- For large spills, establish diking around leading edge of spill using sand, clay or other appropriate material.

Emergency Response Equipment

The following equipment will be staged in the support zone and throughout the site, as needed, to provide for safety and first aid during emergency responses. (Emergency eyewash equipment meets ANSI Standard);

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash/safety shower
- Emergency signal horn

Emergency Spill Response Clean-Up Materials and Equipment

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be inventoried and inspected, visually, on a weekly basis.

In addition to the equipment listed above, Shaw E&I maintains direct reading instrumentation that may be used in emergency situations to assess the degree of environmental hazard. This equipment will only be used by the Site Safety Officer or other specially trained personnel. This equipment will be stored, charged and ready for immediate use in evaluating hazardous chemical concentrations. The equipment will be located at the SHAW E&I office trailer.

Table 9.3
Emergency Monitoring Equipment

EQUIPMENT NAME	APPLICATION
PID	Measures volatile organic compounds
LEL/O2	Measures for potential flammable and oxygen (enriched/deficient) atmospheres

The following equipment will be kept on site and dedicated for spill cleanup:

- Overpack drums
- 55-gallon open-top drums for containerization of waste materials.
- Sand or clay to solidify/absorb liquid spills.

EMERGENCY CONTINGENCY PLAN

This section of the ERCP details the contingency measures SHAW E&I will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies. The SSO will contact the local hospital and inform them of the site hazards and potential emergency situations. A minimum of two First-Aid/CPR trained personnel will be maintained on site.

Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the Site Safety Officer. The following actions will then be taken depending on the severity of the incident:

Life-Threatening Incident

If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the work area will be evacuated by SHAW E&I personnel to a clean area for treatment by (EMS) personnel. No one will be able to enter the work area without showing proof of training, medical surveillance and site orientation.

Non Life-Threatening Incident

If it is determined that no threat to life is present, the SS will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

*NOTE: The area surrounding an accident site must not be disturbed until the scene has been cleared by the SS.

Any personnel requiring emergency medical attention will be evacuated from work areas if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

- If decontamination cannot be performed, observe the following procedures.

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.

- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures.

- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the PM and SSO. An accident/injury/illness report will be completely and properly filled out and submitted to the responsible Health and Safety Manager or CIH, in accordance with Shaw's reporting procedures HS020.

A list of emergency telephone numbers is given in Table 9.2.

Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site Emergency Coordinator
- Workers in the affected areas
- PM

- HSM
- ROICC

FIRE CONTINGENCY MEASURES

Shaw E&I personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the emergency coordinator by radio and vacate the structure or area. The emergency coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.

- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.

- Fire extinguishers will be placed in all areas where a fire hazard may exist.

- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

Response

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify his or her supervisor who will then contact the Emergency Coordinator by radio. The emergency coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a worker has extinguished a small fire, the emergency coordinator will be notified.

HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains
- High Winds

Response

- All equipment will be shut down and secured to prevent damage.

- Personnel will be moved to safe refuge, initially crew trailers. The emergency coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

Notification

The emergency coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- Shaw E&I employees and subcontractors
- PM
- ROICC
- Local Emergency Management Agency

SPILL/RELEASE CONTINGENCY MEASURES

In the event of release or spill of a hazardous material the following measures will be taken:

Response

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source.

Utilizing radio communications, the emergency coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Notification procedures will be followed to inform on-site personnel and off-site agencies. The emergency coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth
- Digging a sump, installing a polyethylene liner and
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- Transferring the material from its original container to another container

The emergency coordinator will notify the ROICC of the spill and steps taken to institute clean up. Emergency response personnel will clean up all spills following the spill clean-up plan developed by the emergency coordinator. Supplies necessary to clean up a spill will be immediately available on-site.

The major supply of material and equipment will be located in the Support Zone. Smaller supplies will kept at active work locations. The emergency coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the ROICC. The emergency coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The emergency coordinator will review the cause with the ROICC and obtain his concurrence with the remedial action plan.

10. TRAINING REQUIREMENTS

As a requirement for work at this site, in any hazardous waste work area, all field personnel will be required to take a 40-hour training class. This training must cover the requirements in 29 CFR 1910.120: personal protective equipment, toxicological effects of various chemicals, hazard communication, blood borne pathogens, handling of unknown tanks and drums, confined-space entry procedures, electrical safety, etc. In addition, all personnel must receive annual 8-hour refresher training and three-day on-site training under a trained, experienced supervisor. Supervisory personnel shall have received an additional 8-hour training in handling hazardous waste operations.

All personnel entering Site 3, 6, & 7 will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in Appendix H.

Site-specific training for activities at the site will include potential site contaminants, Hazard Communication as per 29 CFR 1910.1200, site physical and environmental hazards, emergency response and evacuation procedures, and emergency telephone numbers will be held by the SS before any site work activities begin.

Outlines of the orientation for Shaw E&I, Shaw E&I sub-contract personnel, and visitors are presented below:

Table 10.1
Training Outlines

SHAW E&I/SUBCONTRACTORS	VISITOR ORIENTATION
• HASP sign off • Sign in/out procedures • Site background • Rules and regulations • Equipment • Emergency Information • Emergency signal • Gathering point • Responsibilities/roles • Emergency phone numbers • Work Zones • Contaminants and Material Safety Data Sheets (MSDS) [Hazard Communication Program] • AHA's (Activity Hazard Analyses) • Forms, site-specific • Incident Reporting	• Sign in/out procedures • Work zones in progress • Hazard Communication • Emergency plan/signals • Training/medical requirements • Zones/areas open to visitors

11. MEDICAL SURVEILLANCE PROGRAM

All Shaw E&I personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of Shaw E& I's worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist and Shaw E&I's occupational health physician. Other medical consultants are retained when additional expertise is required.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120/1926.65(f).

No specific tests are expected for this project.

The following information is provided in the event that medical attention is necessary.

The Shaw E&I Medical Director is:

Dr. Jerry H. Berke
MD, MPH
Health Resources
600 West Cumming park
Suite 3400
Woburn, Mass 01801-6350
781-935-8581 (direct dial)
800-350-4511 (toll free)

The Shaw E&I Medical Director and the HSM will be immediately notified of any suspected exposures to hazardous materials/wastes.

APPENDIX A
MATERIAL SAFETY DATA SHEETS (MSDS's)

* *
* NIOSH POCKET GUIDE TO CHEMICAL HAZARDS *
* *
* Produced by: US National Institute for Occupational Safety and Health *
* Provided by: Canadian Centre for Occupational Health and Safety *
* NPG diskette - March 1998 *

CHEMICAL NAME : Coal tar pitch volatiles
SYNONYMS : Synonyms vary depending upon the specific compound (e.g.
pyrene
phenanthrene
acridine
chrysene
anthracene & benzo(a)pyrene).
CAS REGISTRY NUMBER : 65996-93-2
RTECS NUMBER : GF8655000
CCOHS RECORD NUMBER : 145

NOTE : NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.
DESCRIPTION : Black or dark-brown amorphous residue.

*** EXPOSURE LIMITS ***

NIOSH RECOMMENDED EXPOSURE LIMITS (REL)
TIME WEIGHTED AVERAGE (TWA) : 0.1 mg/m3 (cyclohexane-extractable fraction)
NOTE : See Appendix A
NOTE : See Appendix C

OSHA CURRENT PERMISSIBLE EXPOSURE LIMITS (PEL)
TIME WEIGHTED AVERAGE (TWA) : 0.2 mg/m3 (benzene-soluble fraction) [1910.1002]
NOTE : See Appendix C

OSHA 1989 (VACATED) PERMISSIBLE EXPOSURE LIMITS (PEL)
TIME WEIGHTED AVERAGE (TWA) : 0.2 mg/m3 (benzene-soluble fraction) [1910.1002]
NOTE : See Appendix C

IDLH CONCENTRATION : Potential NIOSH carcinogen.
[80 mg/m3]

*** RESPIRATORY PROTECTION ***

RECOMMENDATIONS FOR RESPIRATOR SELECTION
BASED ON NIOSH REL

AT CONCENTRATIONS ABOVE THE NIOSH REL, OR WHERE THERE IS NO REL, AT ANY DETECTABLE CONCENTRATION:
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000)
OR Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode (APF = 10,000)

ESCAPE:
Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter (APF = 50)
OR Any appropriate escape-type, self-contained breathing apparatus

*** PERSONAL PROTECTION AND SANITATION ***

SKIN PROTECTION :
Wear appropriate personal protective clothing to prevent skin contact.

EYE PROTECTION :
Wear appropriate eye protection to prevent eye contact.

SKIN CLEAN-UP :
The worker should wash daily at the end of each work shift.

CLOTHING/PPE REMOVAL :
No recommendation is made specifying the need for removing clothing that becomes wet or contaminated.

CLOTHING/PPE CHANGE :
Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises.

*** HEALTH HAZARDS AND FIRST AID ***

POTENTIAL ROUTES OF EXPOSURE :
Inhalation; Skin and/or eye contact

POTENTIAL SYMPTOMS OF EXPOSURE :
Dermatitis, bronchitis, potential occupational carcinogen

TARGET ORGANS :
Respiratory system, skin, bladder, kidneys

POTENTIAL OCCUPATIONAL CARCINOGEN :
lung, kidney & skin cancer

EYES - FIRST AID :
If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

SKIN - FIRST AID :
If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.

INHALATION - FIRST AID :
If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

INGESTION - FIRST AID :
If this chemical has been swallowed, get medical attention immediately.

*** PHYSICAL AND CHEMICAL PROPERTIES ***

MOLECULAR WEIGHT : Properties vary depending upon the specific compound.

FLAMMABILITY CLASS :
Combustible Solids
INCOMPATIBILITIES AND REACTIVITIES :
Strong oxidizers

MEASUREMENT METHOD :
Particulate filter; Benzene; Gravimetric; OSHA Analytical Methods Manual, 1990

edition [#58]

*** EXPOSURE LIMIT APPENDICES ***

NIOSH REL NOTES
Appendix A:
New Policy
For the past 20 plus years, NIOSH has subscribed to a carcinogen policy that was published in 1976 by Edward J. Fairchild, II, Associate Director for Cincinnati Operations, which called for "no detectable exposure levels for proven carcinogenic substances" (Annals of the New York Academy of Sciences, 271:200-207, 1976). This was in response to a generic OSHA rulemaking on carcinogens. Because of advances in science and in approaches to risk assessment and risk management, NIOSH has adopted a more inclusive policy. NIOSH recommended exposure limits (RELs) will be based on risk evaluations using human or animal health effects data, and on an assessment of what levels can be feasibly achieved by engineering controls and measured by analytical techniques. To the extent feasible, NIOSH will project not only a no-effect exposure, but also exposure levels at which there may be residual risks. This policy applies to all workplace hazards, including carcinogens, and is responsive to Section 20(a)(3) of the Occupational Safety and Health Act of 1970, which charges NIOSH to ". . .describe exposure levels that are safe for various periods of employment, including but not limited to the exposure levels at which no employee will suffer impaired health or functional capacities or diminished life expectancy as a result of his work experience."
.
The effect of this new policy will be the development, whenever possible, of quantitative RELs that are based on human and/or animal data, as well as on the consideration of technological feasibility for controlling workplace exposures to the REL. Under the old policy, RELs for most carcinogens were non-quantitative values labeled "lowest feasible concentration (LFC)." [Note: There are a few exceptions to LFC RELs for carcinogens (e.g., RELs for asbestos, formaldehyde, benzene, and ethylene oxide are quantitative values based primarily on analytical limits of detection or technological feasibility). Also, in 1989, NIOSH adopted several quantitative RELs for carcinogens from OSHA's permissible exposure limit (PEL) update.]
.
Under the new policy, NIOSH will also recommend the complete range of respirators (as determined by the NIOSH Respirator Decision Logic) for carcinogens with quantitative RELs. In this way, respirators will be consistently recommended regardless of whether a substance is a carcinogen or a non-carcinogen.
.
Old Policy
In the past, NIOSH identified numerous substances that should be treated as potential occupational carcinogens even though OSHA might not have identified them as such. In determining their carcinogenicity, NIOSH used the OSHA classification outlined in 29 CFR 1990.103, which states in part:
.
"Potential occupational carcinogen means any substance, or combination or mixture of substances, which causes an increased incidence of benign and/or malignant neoplasms, or a substantial decrease in the latency period between exposure and onset of neoplasms in humans or in one or more experimental mammalian species as the result of any oral, respiratory or dermal exposure, or any other exposure which results in the induction of tumors at a site other than the site of administration. This definition also includes any substance which is metabolized into one or more potential occupational carcinogens by mammals."
.
When thresholds for carcinogens that would protect 100 percent of the population had not been identified, NIOSH usually recommended that occupational exposures to carcinogens be limited to the lowest feasible

concentration. To ensure maximum protection from carcinogens through the use of respiratory protection, NIOSH also recommended that only the most reliable and protective respirators be used. These respirators include (1) a self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a positive-pressure mode, or (2) a supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in a pressure-demand or other positive-pressure mode.
.
Appendix C: NIOSH considers coal tar products (i.e., coal tar, coal tar pitch, or creosote) to be potential occupational carcinogens; the NIOSH REL (10-hour TWA) for coal tar products is 0.1 mg/m3 (cyclohexane-extractable fraction).

OSHA PEL NOTES
Appendix C: The OSHA PEL (8-hour TWA) for coal tar pitch volatiles is 0.2 mg/m3 (benzene-soluble fraction). OSHA defines "coal tar pitch volatiles" in 29 CFR 1910.1002 as the fused polycyclic hydrocarbons that volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter and includes substances such as anthracene, benzo(a)pyrene (BaP), phenanthrene, acridine, chrysene, pyrene, etc.

*** END OF RECORD ***

APPENDIX B
SPECIFIC HEALTH AND SAFETY PROCEDURES

***NOTE:** SHAW E& I health and safety procedures that will be utilized during the project ar listed below. A copy of all the Shaw E&I Health and Safety Procedures (HS001-999) is available on theShaw E&I Intranet (Loop).*

HS020	Accident Prevention Program: Reporting Investigation and Review
HS021	Accident Prevention Program: Management Safety Reviews
HS051	Tailgate Safety Meeting
HS060	Hazard Communication Program
HS106	First Aid Kits
HS303	Pressurized Water Cleaning and Cutting Equipment
HS400	Working in Hot Environments
HS401	Cold Stress
HS402	Hearing Conservation
HS600	Personal Protection Program
HS601	Respiratory Protection
HS800	Motor Vehicle Operation: General Requirements
HS820	Forklift Operations

PROCEDURE

Subject: **ACCIDENT PREVENTION PROGRAM: MANAGEMENT SAFETY INSPECTIONS**

1.0 PURPOSE AND SUMMARY

This procedure establishes the requirement for management safety inspections of project and office locations. These inspections are an integral part of the overall accident prevention program and help to demonstrate management's commitment to safety. Key requirements of this procedure include:

- Project managers are required to conduct one inspection per month and ensure that at least one other inspection is conducted during the month;
- Office managers are required to conduct an office safety inspection once every six months; and
- Completed inspection reports are given to the project/office health and safety representative for review. A copy of the completed report will then be forwarded to the respective business line health and safety manager.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 TEXT

Inspections of project and office locations by managers, supervisors, and the health and safety staff are critical factors in a comprehensive accident prevention program. Management safety inspections help demonstrate management's commitment to safety and verify that proper work practices are in use. These inspections are also used to verify the existence of safe work conditions and regulatory compliance. All employees are afforded the opportunity to participate in the inspection process via the safety interview process.

4.1 Safety Inspections and Documentation

Safety inspections are required by various tiers of the management structure. The objective is for operation managers to visibly demonstrate their concern for safety in the workplace by direct contact with employees while in the workplace. Each inspection is to be documented on the appropriate Safety Inspection Report (Attachment 2 or 3).

The primary responsibilities of the inspector include:

- Interviewing employees with regard to health and safety issues and how they might be corrected;
- Observing and correcting unsafe conditions and acts; and
- Verifying that corrective actions have been assigned to a responsible employee and implemented.

Positive safety observations and safety issues not specifically addressed in the Safety Inspection Report can be documented on the last page of the report. A list of all corrective action items will be maintained showing the corrective action, responsible person, and the date action is to be completed. Completed reports are to be given to the project/office health and safety representative, then forwarded to the respective business line health and safety manager.

4.1.1 Management Site Visits

Each senior manager is encouraged to make an informal safety inspection and review previously conducted inspection reports, during each site visit, to demonstrate their commitment to safety and reinforce the responsibilities of project management. Findings during this informal inspection are to be brought to the attention of the project manager so that corrective action can be initiated.

4.1.2 Project Managers

All project managers are required to complete at least one safety inspection per month and ensure that at least one other safety inspection per month is conducted. In the event that the project manager is not present at the project site during the month, this responsibility may be delegated to the project supervisor.

4.1.3 Office Managers

Office managers are required to conduct an office safety inspection once every six months. Managers are encouraged to conduct more frequent inspections if the office location is being remodeled or if new space is being occupied that was not previously inspected.

4.1.4 Project Supervisors

Project supervisors are expected to inspect their projects monthly and ensure that corrective actions are implemented. Dependent upon project manager participation, project supervisors may also be required to conduct an additional monthly inspection. The requirement to conduct these inspections cannot be delegated.

4.1.5 Health and Safety Representative

Health and safety representatives must continually observe activities and correct unsafe acts/conditions as soon as reasonably possible. They are also required to review each Safety Inspection Report completed at their location to ensure that corrective actions are implemented. Once this review is complete, they will forward the reports to the appropriate business line health and safety manager.

4.2 Workshops

Health and safety representatives will present workshops and/or conduct joint inspections to help managers and supervisors develop their inspection skills.

5.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

6.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances

7.0 ATTACHMENTS

1. Responsibility Matrix
2. Project Safety Inspection Report
3. Office Safety Inspection Report

ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM : MANAGEMENT SAFETY INSPECTIONS RESPONSIBILITY MATRIX

		Responsible Party				
Action	**Procedure Section**	**Senior Managers**	**Project/ Office Manager**	**Project Supervisors**	**Health and Safety Representative**	**Vice President, Health and Safety**
Issue, Revise, and Maintain Procedure	3.1					X
Conduct Informal Safety Inspections and Review Previously Completed Reports	4.1.1	X				
Conduct Safety Inspections	4.1.2 4.1.3 4.1.4		X	X		
Give Completed Reports to Health and Safety Representative	4.1.2 4.1.3 4.1.4		X	X		
Review Reports and Forward to Health and Safety Manager	4.1.5				X	
Conduct Inspection Workshops	4.2				X	

ATTACHMENT 2

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** _________________________

BUSINESS LINE: ______________ PROJECT NAME/NUMBER:
PROGRAM MANAGER: ________________ PROJECT MANAGER:
GENERAL PROJECT DESCRIPTION:
SITE ACTIVITIES AT TIME OF INSPECTION:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ________________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: ______________________________ DATE:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ________________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: ______________________________ DATE:

INSPECTION COMPLETED BY: _____________________________ DATE:

HEALTH AND SAFETY REVIEW BY: ________________________ DATE:

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ___

	YES	NO	N/A
FIRST AID			
1. Are first aid kit locations identified and accessible?			
2. Are emergency eye wash/safety showers available and inspected monthly?			
3. Are first aid kits inspected weekly?			
4. Is a qualified first aid/CPR provider on site?			
PERSONAL PROTECTIVE EQUIPMENT			
1. Have levels of personnel protection been established?			
2. Are respirators decontaminated, inspected, and stored according to standard procedures?			
3. Have employees been fit-tested?			
4. Is defective personal protective equipment tagged and taken out of service?			
5. Does compressed breathing air meet CGA Grade "D" minimum?			
6. Are there sufficient sizes and quantities of protective equipment?			
7. At a minimum, are employees utilizing safety glasses, hard hats, and steel toe boots?			
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?			
2. Are fire lanes established and maintained?			
3. Are flammable liquid dispensing systems bonded?			
4. Are approved safety cans available for storage of flammable liquids?			
5. Has the local fire department been contacted?			
6. Are fire extinguishers available and inspected monthly?			
7. Are flammables and combustibles properly stored?			
8. Are flammable storage cabinets available and used when needed?			
AIR MONITORING			
1. Is required air monitoring being conducted?			
2. Are air monitoring instruments calibrated daily?			
3. Are air monitoring logs up to date?			
4. Are instrument user manuals available?			
5. Are instruments being maintained?			
6. Are employees notified of personal sampling results within 5 days of receipt?			
WELDING AND CUTTING			
1. Are fire extinguishers present at welding and cutting operations?			
2. Are confined spaces evaluated prior to and during cutting and welding operations?			
3. Have Hot Work Permits been completed?			
4. Are proper helmets, goggles, aprons, and gloves available for welding and cutting operations?			
5. Are welding machines properly grounded?			
6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart?			
7. Are only trained personnel permitted to operate welding and cutting equipment?			
8. Are gas cylinders transported in a secured vertical position with caps in place?			
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?			
2. Is eye protection available and used when operating power tools?			
3. Are guards and safety devices in place on power tools?			

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ___

	YES	NO	N/A
4. Are power tools inspected before each use?			
5. Are nonsparking tools available when necessary?			
6. Is the correct tool being used for the job?			

MOTOR VEHICLES

	YES	NO	N/A
1. Are vehicles regularly inspected?			
2. Are personnel licensed for the vehicles they operate?			
3. Are unsafe vehicles tagged and reported to supervision?			
4. Is vehicle's safety equipment operating properly?			
5. Are loads secure?			
6. Are vehicle occupants using safety belts?			
7. Are current insurance cards and blank accident report forms located in vehicles?			

EMERGENCY PLANS

	YES	NO	N/A
1. Are emergency telephone numbers posted?			
2. Have emergency escape routes been designated?			
3. Are employees familiar with the emergency signal?			
4. Has the emergency route to the hospital been established and posted?			
5. Is a vehicle on site that can transport injured employees to the hospital?			

MATERIALS HANDLING

	YES	NO	N/A
1. Are materials stacked and stored to prevent sliding or collapsing?			
2. Are tripping hazards identified?			
3. Are semi-trailers chocked?			
4. Are fixed jacks used under semi-trailers?			
5. Are riders prohibited on materials handling equipment?			
6. Are approved manlifts provided for the lifting of personnel?			
7. Are personnel in manlifts wearing approved fall protection devices?			

FIRE PROTECTION

	YES	NO	N/A
1. Has a fire alarm system been established?			
2. Do employees know the location and use of all fire extinguishers?			
3. Are fire extinguisher locations posted?			
4. Are combustible materials segregated from open flames?			
5. Have fire extinguishers been professionally inspected during the last year?			
6. Are fire extinguishers visually inspected monthly?			

ELECTRICAL

	YES	NO	N/A
1. Is electrical equipment and wiring properly guarded and maintained in good condition?			
2. Are extension cords kept out of wet areas?			
3. Is damaged electrical equipment tagged and taken out of service?			
4. Have underground electrical lines been identified by proper authorities?			
5. Has a lockout/tagout system been established?			
6. Are GFCIs being used on all temporary electrical systems and as needed?			

ELECTRICAL (continued)

	YES	NO	N/A
7. Are extension cords being inspected daily (i.e., group pin in place, no unapproved splices)?			
8. Are warning signs exhibited on high voltage equipment (250V or greater)?			

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ___

	YES	NO	N/A
9. Is adequate distance maintained from overhead electrical lines?			
10. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?			

CRANES AND RIGGING

	YES	NO	N/A
1. Are cranes inspected daily prior to use?			
2. Are crane swing areas barricaded or demarked?			
3. Is all rigging equipment tagged with an identification number and rated capacity?			
4. Is rigging equipment inspection documented?			
5. Are slings, chains, and rigging inspected before each use?			
6. Are damaged slings, chains, and rigging tagged and taken out of service?			
7. Are slings padded or protected from sharp corners?			
8. Do employees keep clear of suspended loads?			
9. Are rated load capacities and special hazard warnings posted on crane?			
10. Are the records of annual crane inspection available?			
11. Has accessible areas within the swing radius of the rear of the crane been barricaded?			
12. Do crane operators have required training/certification?			

COMPRESSED GAS CYLINDERS

	YES	NO	N/A
1. Are breathing air cylinders charged only to prescribed pressures?			
2. Are like cylinders segregated and stored in well ventilated areas?			
3. Is smoking prohibited in cylinder storage areas?			
4. Are cylinders stored secure and upright?			
5. Are cylinders protected from snow, rain, etc.?			
6. Are cylinder caps in place before cylinders are moved?			
7. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?			
8. Are propane cylinders stored and used only outside of buildings?			

SCAFFOLDING

	YES	NO	N/A
1. Is scaffolding placed on a flat, firm surface?			
2. Are scaffold planks free of mud, ice, grease, etc.?			
3. Is scaffolding inspected before each use?			
4. Are defective scaffold parts taken out of service?			
5. Have employees completed scaffold user training?			
6. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?			
7. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?			
8. Are employees restricted from working on scaffolds during storms and high winds?			
9. Are all pins in place and wheels locked?			
10. Is required perimeter guarding (top rail, mid rail, and toe board) present?			
11. Has a competent person been designated to oversee scaffold construction?			
12. Are employees prohibited from moving mobile scaffold horizontally while employees are on them?			
13. Are all scaffold components manufactured by the same company?			

WALKING AND WORKING SURFACES

	YES	NO	N/A
1. Are ladders regularly inspected?			
2. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?			
3. Are ladders being used in a safe manner?			
4. Are ladders kept out of passageways, doors, or driveways?			

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ___

	YES	NO	N/A
5. Are broken or damaged ladders tagged and taken out of service?	___	___	___
6. Are metal ladders prohibited in electrical service?	___	___	___
7. Are stairways and floor openings guarded?	___	___	___
8. Are safety feet installed on straight and extension ladders?	___	___	___
9. Is general housekeeping being maintained?	___	___	___
10. Are ladders tied off?	___	___	___
11. Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?	___	___	___

SITE SAFETY PLAN

	YES	NO	N/A
1. Is a site safety plan available on site or accessible to all employees?	___	___	___
2. Does the safety plan accurately reflect site conditions and tasks?	___	___	___
3. Have potential hazards been described to employees on site?	___	___	___
4. Is there a designated safety official on site?	___	___	___
5. Have all employees signed the safety plan acknowledgment form?	___	___	___

SITE POSTERS

	YES	NO	N/A
1. Are the following posters displayed in a prominent and accessible area?			
A. Minimum Wage	___	___	
B. OSHA Job Protection	___	___	
C. Equal Employment Opportunity	___	___	
2. Are all required state-specific posters displayed?	___	___	

SITE CONTROL

	YES	NO	N/A
1. Are work zones clearly marked?	___	___	___
2. Are support trailers located to minimize exposure from a potential release?	___	___	___
3. Are support trailers accessible for approach by emergency vehicles?	___	___	___
4. Is the site properly secured during and after work hours?	___	___	___
5. Is an exclusion zone sign-in/sign-out log maintained?	___	___	___
6. Are only employees with current training and physicals permitted in exclusion zone?	___	___	___

HEAVY EQUIPMENT

	YES	NO	N/A
1. Is heavy equipment inspected as prescribed by the manufacturer?	___	___	___
2. Is defective heavy equipment tagged and taken out of service?	___	___	___
3. Are project roads and structures inspected for load capacities and proper clearances?	___	___	___
4. Is heavy equipment shut down for fueling and maintenance?	___	___	___
5. Are backup alarms installed and working on mobile equipment?	___	___	___
6. Have qualified equipment operators been designated?	___	___	___
7. Are riders prohibited on heavy equipment?	___	___	___
8. Are guards and safety appliances in place and used?	___	___	___
9. Are operators using the "three point" system when mounting/dismounting equipment?	___	___	___

EXCAVATION

	YES	NO	N/A
1. Has a "competent person" been designated to oversee excavation activities?	___	___	___
2. Prior to opening excavations, are utilities located and marked?	___	___	___
3. Has a professional engineer evaluated all excavations greater than 20 feet deep?	___	___	___
4. Is there rescue equipment on site and accessible to the excavation area?	___	___	___
5. Is excavated material placed a minimum of 24 inches from the excavation?	___	___	___

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ___

		YES	NO	N/A
6.	Are the sides of excavations sloped or shored to prevent cave ins?	____	____	____
7.	Have excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O_2 deficiency)?	____	____	____
8.	Are ladders or ramps used in excavations over 4 feet deep?	____	____	____
9.	Are means of egress available so as to require no more than 25 feet of lateral travel?	____	____	____
10.	Are barriers, i.e., guardrails or fences, placed around excavations near pedestrian or vehicle thoroughfares?	____	____	____
11.	Is excavation inspected daily by competent persons and documented?	____	____	____

CONFINED SPACES

		YES	NO	N/A
1.	Have employees been trained in the hazards of confined spaces?	____	____	____
2.	Are confined space permits posted at entrance to confined space?	____	____	____
3.	Is a copy of the confined space entry procedure available?	____	____	____
4.	Has a rescue plan been established?	____	____	____
5.	Is an entry supervisor present at each permit-required entry?	____	____	____
6.	Are required extraction/fall protection devices being used?	____	____	____

DECONTAMINATION

		YES	NO	N/A
1.	Are decontamination stations set up on site?	____	____	____
2.	Is decontamination water properly contained and disposed of?	____	____	____
3.	Are all pieces of equipment inspected for proper decontamination before leaving the site?	____	____	____
4.	Are shin/metatarsal guards being used during power washing activities?	____	____	____

HAZARD COMMUNICATION

		YES	NO	N/A
1.	Is there a copy of the HAZCOM procedure on site?	____	____	____
2.	Are there MSDSs for required materials/chemicals present on site?	____	____	____
3.	Are all containers properly labeled, as to content, hazard?	____	____	____
4.	Have employees been trained in accordance with the HAZCOM procedure?	____	____	____
5.	Do employees (including subcontractors) know and understand the effects of exposure from the chemicals on site?	____	____	____
6.	Have all personnel signed the HAZCOM acknowledgment form?	____	____	____
7.	Is there an updated list of chemicals maintained on site?	____	____	____

TRAINING

		YES	NO	N/A
1.	Are tailgate safety meetings being conducted daily?	____	____	____
2.	Are current training/medical records maintained on site?	____	____	____

DOCUMENTATION

		YES	NO	N/A
1.	Is an OSHA 200 Log maintained on site and posted during the month of February?	____	____	____
2.	Are accident report forms available?	____	____	____
3.	Is a copy of health and safety policy and procedures available on site?	____	____	____

PROJECT SAFETY INSPECTION REPORT

PROJECT ________________________________ **DATE** ____________________

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

ATTACHMENT 3

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ **DATE** ______________________

DATE: ____________ OFFICE NAME:
OFFICE MANAGER:
AREA(S) OF OFFICE INSPECTED:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ______________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: ______________________________ DATE:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ______________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: ______________________________ DATE:

INSPECTION COMPLETED BY: ____________________________ DATE:

HEALTH AND SAFETY REVIEW BY: ________________________ DATE:

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ **DATE** __

	YES	NO	N/A
FIRST AID			
1. Are first aid kits accessible and identified?	______	______	______
2. Are emergency eye wash/safety showers available where needed and inspected?	______	______	______
3. Are first aid kits inspected weekly?	______	______	______
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?	______	______	______
2. Are fire lanes/evacuation routes established and maintained?	______	______	______
3. Are approved safety cans/cabinets available for storage of flammable liquids?	______	______	______
4. Are fire exits clearly identified and unobstructed?	______	______	______
FURNITURE AND EQUIPMENT			
1. Are desks, file cabinets, etc. arranged so that drawers do not open into aisles or walkways?	______	______	______
2. Are desk and file drawers closed after use?	______	______	______
3. Is weight distributed in file cabinets so that upper drawer contents does not create a top-heavy condition?	______	______	______
4. Are cabinets, bookcases, and shelves secured to prevent their falling over?	______	______	______
5. Are faulty desks, chairs, or other office equipment repaired or taken out of service?	______	______	______
6. Is adequate and sufficient lighting provided in all work areas?	______	______	______
7. Are paper cutter blades in fully down and locked position when not in use?	______	______	______
8. Are work stations arranged to be comfortable without unnecessary strains on backs, arms, necks, etc.?	______	______	______
9. Do machines with exposed moving parts have appropriate guards?	______	______	______
AISLES AND FLOORS			
1. Is aisle clearance adequate for two-way traffic and for unobstructed access to all parts of the office and building?	______	______	______
2. Does office arrangement allow easy egress under emergency conditions?	______	______	______
3. Are wastebaskets, briefcases, or other objects placed where they are not a tripping hazard?	______	______	______
4. Are floors clear of pencils, bottles, and other loose objects?	______	______	______
5. Are tripping hazards from electrical cords, phone outlets, or other protrusions on the floor prevented by arrangement of furniture or other means?	______	______	______
6. Are floors free of loose tiles and projections that can create a tripping hazard?	______	______	______
7. Is carpeting in good condition and not badly worn or torn?	______	______	______
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?	______	______	______
2. Is eye protection available and used when operating power tools?	______	______	______
3. Are guards and safety devices in place on power tools?	______	______	______
4. Are power tools inspected before each use?	______	______	______
5. Is the correct tool being used for the job?	______	______	______
6. Do knife blades have guards when not in use?	______	______	______
MOTOR VEHICLES			
1. Are vehicles regularly inspected?	______	______	______
2. Are personnel licensed for the vehicles they operate?	______	______	______
3. Are unsafe vehicles reported to supervision?	______	______	______
4. Is safety equipment on vehicles?	______	______	______
5. Are loads secure on vehicles?	______	______	______

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ **DATE** __

	YES	NO	N/A
6. Are vehicle occupants using safety belts?	___	___	___
7. Are current insurance cards and blank accident report forms located in vehicles?	___	___	___
EMERGENCY PLANS			
1. Are emergency telephone numbers posted?	___	___	___
2. Have emergency escape routes been designated?	___	___	___
3. Are employees familiar with the emergency signal?	___	___	___
4. Has an emergency route to the hospital been established and posted?	___	___	___
MATERIALS HANDLING			
1. Are materials stacked and stored to prevent sliding or collapsing?	___	___	___
2. Are flammables and combustibles stored in approved containers?	___	___	___
3. Are tripping hazards identified?	___	___	___
4. Are riders prohibited on material handling equipment?	___	___	___
FIRE PROTECTION			
1. Has a fire alarm system been established?	___	___	___
2. Do employees know the location and use of all fire extinguishers?	___	___	___
3. Are fire extinguisher locations marked?	___	___	___
4. Have fire extinguishers been professionally inspected during the last year?	___	___	___
5. Are fire extinguishers visually inspected monthly?	___	___	___
6. Is there an operating fire detection system?	___	___	___
ELECTRICAL			
1. Are extension cords kept out of wet areas?	___	___	___
2. Are certified electricians used for electrical work?	___	___	___
3. Are GFCIs being used as needed?	___	___	___
4. Are extension cords not being used in lieu of permanent wiring?	___	___	___
5. Are warning signs exhibited on high voltage equipment (250V or greater)?	___	___	___
6. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?	___	___	___
7. Are electric fans protected with guards of not over one-half inch mesh, which prevents fingers getting inside guard?	___	___	___
8. Are cords, panels, receptacles, and plugs in good condition?	___	___	___
9. Are multi-outlet strips not plugged into other multi-outlet strips?	___	___	___
10. Are extension cords not plugged into other extension cords?	___	___	___
11. Are circuit breakers or fuse panels properly labeled, kept closed, and accessible?	___	___	___
12. Are extension cords arranged so that they are not placed over radiators, steam pipes, through doorways, or under carpets?	___	___	___
13. Do space heaters have automatic shut-offs that will actuate if the heater tips over?	___	___	___
14. Are space heaters UL listed and plugged directly into a wall receptacle?	___	___	___
15. Are space heaters located at least 3 feet from combustible material?	___	___	___
WALKING AND WORKING SURFACES			
1. Are cords, cables, and other items not placed in walkways?	___	___	___
2. Are ladders regularly inspected?	___	___	___
3. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?	___	___	___
4. Are ladders being used in a safe manner?	___	___	___
5. Are ladders kept out of passageways, doors, or driveways?	___	___	___
6. Are broken or damaged ladders tagged and taken out of service?	___	___	___
7. Are metal ladders prohibited in electrical service?	___	___	___

OFFICE SAFETY INSPECTION REPORT

OFFICE ________________________________ **DATE** __

		YES	NO	N/A
8.	Are stairways and floor openings guarded?	______	______	______
9.	Are safety feet installed on straight and extension ladders?	______	______	______
10.	Are employees walking instead of running?	______	______	______
11.	Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?	______	______	______
12.	Are there torn, loose, or curled carpets?	______	______	______

<u>HOUSEKEEPING</u>

		YES	NO	N/A
1.	Is good housekeeping maintained?	______	______	______
2.	Are paper and materials stored properly?	______	______	______
3.	Are cleaning fluids used only in small quantities and stored in closed containers that are kept in well-ventilated areas?	______	______	______
4.	If cleaning fluids are flammable, are they not used near a flame or an open heating element?	______	______	______
5.	Are wastebaskets emptied on a daily basis?	______	______	______

<u>SITE POSTERS</u>

1. Are the following posters displayed in a prominent and accessible area?

		YES	NO
A.	Minimum Wage	______	______
B.	OSHA Job Protection	______	______
C.	Equal Employment Opportunity	______	______

		YES	NO
2.	Are all required state-specific posters displayed?	______	______

<u>HAZARD COMMUNICATION</u>

		YES	NO	N/A
1.	Is the written HAZCOM program available?	______	______	______
2.	Is there a MSDS <u>FOR EACH HAZARDOUS CHEMICAL</u> present in the office?	______	______	______
3.	Are all containers properly labeled, as to content, hazard?	______	______	______
4.	Have employees been trained on chemical hazards?	______	______	______
5.	Have all employees signed the HAZCOM acknowledgment form?	______	______	______
6.	Is there a list of chemicals maintained on site?	______	______	______

<u>DOCUMENTATION</u>

		YES	NO	N/A
1.	Is an OSHA 200 Log maintained and posted during the month of February?	______	______	______
2.	Are accident report forms available?	______	______	______
3.	Is a copy of health and safety policy and procedures available?	______	______	______

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ **DATE** ____________________

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

PROCEDURE

Subject: **TAILGATE SAFETY MEETINGS**

1.0 PURPOSE AND SUMMARY

This procedure establishes the requirement for the conductance of tailgate safety meetings. These meetings are to be conducted at each company project site, on a daily basis, prior to the start of any work activities.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Tailgate Safety Meeting - A short training or informative session that provides safety guidelines for the planned work activities for the day or shift.

5.0 TEXT

The project supervisor or his/her designee conducts a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the work site. The topics discussed at the tailgate safety meeting should cover the work assignments for the day, the expected hazard(s) presented by the work, and an explanation on how employees will protect themselves from those hazards.

The meetings are to be documented by the completion of a Tailgate Safety Meeting Form. The project supervisor will assure that the form is properly completed and signed by all attendees. Completed forms will be maintained in the project files.

The following sections provide guidance for the completion of the form:

A. **Project Name/Number** - Specific project name and number assigned to the project.

B. **Date** - Date of meeting.

C. **Time** - Time at which meeting is held.

D. **Client** - Identification, name, etc. of entity for whom work is to be performed.

E. **Work Activities** - Detailed description of the work activities to be performed that day.

F. **Hospital Name/Address** - Hospital name and address designated to be used for the project.

G. **Phone Number** - Designated hospital non-emergency phone number.

H. **Ambulance** - Phone number for medical emergency transportation.

I. **Safety Topics Presented:**

1. **Chemical Hazards** - Specific chemical name and adverse properties of all chemicals to be encountered on the job that day. A Material Safety Data Sheet (MSDS) for each should be available and discussed in accordance with Procedure HS060.

2. **Physical Hazards** - Address physical hazards associated with the work site, such as slipping/tripping/falling hazards, pinch points, overhead hazards, and nearby operations that could pose a hazard.

3. **Personal Protective Equipment** - Specify levels of protective clothing and protective devices to be used by employees for each of the day's activities.
4. **New Equipment** - Indicate proper work techniques and any hazards associated with new or unfamiliar equipment.

5. **Other Safety Topic(s)** - List any remaining safety topics pertinent to the potential hazards of the job for that day. This is an area where different, unique subjects can be introduced to make the tailgate safety meeting more interesting.

J. **Attendees** - Printed name and signature of all persons in attendance. (Also, list affiliation if not employed by the company.)

K. **Meeting Conducted By** - Printed name and signature of individual conducting the tailgate safety meeting.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS060 Hazard Communication Program

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Tailgate Safety Meeting Form

ATTACHMENT 1
TAILGATE SAFETY MEETINGS

Responsibility Matrix

Action	Procedure Section	*Responsible Party* Vice President of Health and Safety	Project Supervisor
Issuance, Revision, and Maintenance of Procedure	3.1	X	
Conduct Meeting	5.0		X

ATTACHMENT 2

TAILGATE SAFETY MEETING FORM

Project Name/Number: ______________________________ Date: __________ Time: __________

Client: ______________________________

Work Activities: ______________________________

Hospital Name/Address: ______________________________

Hospital Phone No.: ______________________ Ambulance Phone No.: ______________

Safety Topics Presented

Chemical Hazards: ______________________________

____

Physical Hazards: ______________________________

____

Personal Protective Equipment:

Activity: ______________________ PPE Level: ______________

Activity: ______________________ PPE Level: ______________

Activity: ______________________ PPE Level: ______________

Activity: ______________________ PPE Level: ______________

Activity: ______________________ PPE Level: ______________

New Equipment: ______________________________

Other Safety Topic(s): ______________________________

____

Attendees

NAME PRINTED	SIGNATURE

Meeting conducted by: ______________________________

PROCEDURE

Subject: **HAZARD COMMUNICATION PROGRAM**

1.0 PURPOSE AND SUMMARY

This procedure has been developed to ensure that all affected company employees are provided with current information on the hazardous chemicals that they may encounter during their work. The basic principle of Hazard Communication (HAZCOM) is that anyone that works with hazardous chemicals has both a need and a right to know the identities and the hazards of any chemical to which they may be occupationally exposed. This principle has been propagated by the Occupational Safety and Health Administration (OSHA) in 29 Code of Federal Regulations (CFR) 1910.1200 *Hazard Communication*.

Some company activities are likely to occur in states or localities that either have or will have requirements that differ from those contained within the federal standard. In such circumstances, the local health and safety representative will be responsible for ensuring that these requirements are included in either a site health and safety plan or a similar document and conveyed to all affected employees. If federal, state, or local regulations vary or conflict, the more protective requirements and practices will be followed.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Article - A manufactured item other than a fluid or particle which is formed to a specific shape or design during manufacture, has end use function dependent in whole or in part upon its shape or design during end use, which under normal conditions of use does not release more than trace amounts of a hazardous substance and does not pose a physical hazard or health risk to employees.

Affected Employee - Any company employee who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I)

Hazardous Chemical - Any chemical which poses a physical or health hazard.

Health Hazard - A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. Health hazards include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

Immediate Use - When hazardous chemicals will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

Label - Any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

Local Health and Safety Representative - The person who is responsible for the management and/or oversight of health and safety activities at a particular workplace. He/she may be assigned as a site health and safety officer or act as a home office health and safety manager who is responsible for multiple workplaces. This person does not necessarily need to be physically located at a workplace in which they are responsible for ensuring that the requirements of this procedure are fulfilled. The local health and safety representative may designate another qualified individual to assume some or all of the responsibilities delineated in this procedure.

Physical Hazard - A chemical for which there is scientifically valid evidence that it is a combustible liquid, compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable, or reactive.

Responsible Party - The entity responsible for preparation or distribution of Material Safety Data Sheets (MSDS) that can provide additional information on the hazardous chemical and appropriate emergency procedures.

Trade Secret - Any confidential formula, pattern, process, device, information, or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not currently know or use it.

Workplace - An establishment, job site, laboratory, office, or project at one geographic location containing one or more work areas.

5.0 TEXT

In accordance with the requirements established in 29 CFR 1910.1200, employers are required to develop, implement, and maintain at each workplace a HAZCOM program. The program contained herein is intended to ensure that the hazards of all chemicals used by employees are evaluated and that information concerning the hazards of each chemical are conveyed to affected employees. The company program generally consists of five provisions, including hazardous chemical inventories, procurement of hazardous chemicals, container labeling, MSDSs, and the development and implementation of employee training programs. Since the company does not typically produce, distribute, or import hazardous chemicals, the focus of this procedure is on establishing an effective consumer/handler type HAZCOM program and the communication of information to our affected employees.

There are some types of chemicals that are specifically exempt from this procedure. These materials include:

- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1967, as amended (42 U.S.C. 6901 *et seq.*), when subject to regulations issued under that Act by the U.S. Environmental Protection Agency.

- Any hazardous chemical as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) when the hazardous chemical is the focus of remedial or removal actions being conducted under CERCLA in accordance with U.S. Environmental Protection Agency regulations.

- Tobacco or tobacco products.

- Wood or wood products, including lumber which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility. Wood or wood products which have been treated with a hazardous chemical are covered by this procedure, and wood which may be subsequently sawed or cut, generating dust.

- Articles.

- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment, or foods intended for personal consumption by employees while in the workplace.

- Any drug, as defined by the Federal Food, Drug, and Cosmetic Act, when it is in solid, final form for direct administration to patient; drugs which are packaged by the manufacturer for sale to consumers in a retail establishment; and drugs intended for personal consumption by employees while in the workplace.

- Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace.

- Any consumer product or hazardous chemical, as defined by Consumer Product Safety Act and Federal Hazardous Chemicals Act, where the employer can show that it is used in the workplace for the purpose intended by the manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended.

- Nuisance particulates where the manufacturer, distributor, or importer can establish that they do not pose any physical or health hazard covered under this procedure.

- Ionizing and nonionizing radiation.

- Biological hazards.

5.1 Hazardous Chemical Inventories

A complete list of all hazardous chemicals known to be present in the workplace which may expose an employee to a physical or health hazard will be maintained. This list will be placed in the front section of the MSDS binder discussed in Section 5.4. The local health and safety representative will be responsible for updating and revising the inventory list as new chemicals are procured or when chemicals are no longer used and have been removed from the workplace. The identity of the hazardous chemical maintained on the list will be consistent with that which appears on the MSDS. All affected employees will be made aware of the location of the MSDS binder.

5.2 Procurement of Hazardous Chemicals

Since the company does not typically manufacture, distribute, or import hazardous chemicals, procurement is the primary method of obtaining hazardous chemicals. The person initiating the procurement of a hazardous chemical will be responsible for requesting a MSDS from the manufacturer or distributor. This MSDS is to be provided either prior to or at the time of receipt of the chemical. Hazardous chemicals are strictly forbidden to be accepted without an accompanying MSDS. Upon receipt of a hazardous chemical, the person receiving the shipment will notify the local health and safety representative so that a review of the MSDS can be conducted. Also, note that the supplier is only required to submit a MSDS with the initial shipment of a hazardous chemical to a specific location.

In the unlikely event that a hazardous chemical is either manufactured, imported, or distributed by the company, the Vice President, Health and Safety will be notified so that required actions, as dictated by OSHA, can be implemented.

5.3 Container Labeling

Labeling on hazardous chemical containers is meant to provide immediate information to affected employees about the hazards of chemicals they will be expected to handle during the course of their job duties. It is the responsibility of the manufacturer, importer, or distributor of the chemical to ensure that each hazardous chemical leaving their place of business is labeled, tagged, or marked with the following information:

- Identity of the hazardous chemical (must be common to the label, the MSDS, and the chemical inventory list);
- Appropriate warnings of the hazardous effects of a chemical (words, pictures, symbols, or any combination that appears on the label and convey the specific physical or health hazards including target organ effects); and
- Name and address of the chemical manufacturer, importer, or other responsible party.

The person receiving the shipment is responsible to ensure that each container of hazardous chemical(s) has been provided with this labeling information. Hazardous chemicals that do not contain adequate labeling will not be accepted by the receiving person. In the event that hazardous chemicals that do not contain adequate labeling are inadvertently received, they are not to be handled until the identity of the material and appropriate hazard warnings are provided. If the hazardous chemical is regulated by a chemical-specific health standard, then it must be labeled in accordance with the requirements of that standard.

As long as the hazardous chemicals are maintained in their original, properly labeled container and their composition is not altered, there is no need for additional labeling. In the event that the chemical is transferred from a labeled container to an unlabeled portable container, the user must label this secondary container unless the container is intended for immediate use of the employee who performs the transfer.

In locations where employees are present who only communicate in languages other than English, all labeling information must be presented in their language as well as in English.

5.4 Material Safety Data Sheets (MSDS)

MSDSs are written documents that convey specific, detailed information about the hazards associated with a specific chemical. It is the responsibility of the manufacturer, importer, or distributor to either provide MSDSs prior to shipment or with the shipped materials. The employee receiving the shipment of materials is responsible to ensure that a MSDS has been supplied. As described in Section 5.2, the employee initiating the procurement is responsible for requesting a MSDS from the manufacturer or distributor. In the event that a MSDS has not been provided, it is the responsibility of the receiving person to obtain one from the manufacturer or distributor as soon as possible. The material will not be handled prior to the receipt of a MSDS.

Each MSDS will be forwarded to the local health and safety representative or a designee who will then place a copy into the MSDS binder. This binder will be maintained in the workplace and updated as new materials arrive. The local health and safety representative will ensure that this binder is reviewed with all affected employees and is readily accessible during each work shift. A designated area for the storage of the binder will be established and all employees are to be informed of its location. Employees can request a personal copy of a MSDS by completing the Employee Request for MSDS form provided in Attachment 2. Where employees travel between workplaces during a work shift, the MSDSs may be kept at the primary workplace. Affected employees must be able to immediately obtain information from the MSDSs in the event of an emergency.

MSDSs will be in English and other languages, as necessary, for the particular employees in which the MSDSs will be used. MSDSs are to include the following information:

- Name, address, and telephone number of the responsible party;
- Identity of the chemical as it appears on the label;
- Hazardous ingredients;
- Physical and chemical characteristics;
- Physical and health hazards;
- Primary route(s) of entry;
- OSHA permissible exposure limit (PEL) or other applicable exposure limits;
- Carcinogen information;
- Safe handling and use information;
- Control measures;
- Emergency and first aid procedures; and
- Date of preparation and latest revision date.

5.5 Training

All affected employees will be provided with information and training on the hazardous chemicals in their work area at the time of their initial assignment, when new information about the hazards of a chemical is discovered, and whenever a new physical or health hazard that the employees have not previously been informed of is introduced into the workplace. The HAZCOM training record has been provided as Attachment 3.

Training on this HAZCOM program may be satisfied by the use of two different types of training sessions. These sessions include:

- **Tailgate Safety Meetings** - These meetings will be used to convey the methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace, the physical and health hazards of the chemicals in the workplace, and the measures that can be taken to protect affected employees from these hazards. The guidelines for this meeting are described in Procedure HS051, Tailgate Safety Meetings.

- **Workplace-Specific or Annual Refresher Training** - Either of these training sessions can be used to convey the details of this HAZCOM program. These details include an explanation of labeling systems, the use of MSDSs, and how employees can obtain and use the appropriate hazard information. These training sessions are discussed further in Procedure HS050, Training Requirements.

Workplace-specific and tailgate safety meetings will be facilitated by the local health and safety representative or another individual who is knowledgeable on the requirements of the HAZCOM program and the specific chemicals that are being discussed. Annual refresher training can only be conducted by personnel previously approved by the company Training Department.

5.6 Trade Secrets

Some hazardous chemical manufacturers, importers, and distributors may withhold proprietary information required to be present on a MSDS. In such instances, the name and telephone number of the manufacturer, importer, or distributor will be forwarded to the Vice President of Health and Safety for further action. It will be the responsibility of the Vice President of Health and Safety to either obtain the necessary information or to decide to reject the chemical for use in company workplaces.

5.7 Contractors

During the execution of our work, there will be situations when the company will be at locations where employees of other entities may be exposed to chemicals being used by the company. It will be the responsibility of the local health and safety representative or designee to provide the other entities' site representative(s) with copies of all MSDSs in which their employees may be exposed, as well as the labeling system in place, the protective measures to be taken, safe handling procedures to be used, and the location and availability of the MSDS binder.

Periodically, company work areas will be located on or adjacent to a facility operated by another entity. In these situations, the local health and safety representative or designee will contact the other entity to obtain applicable MSDS(s) for hazardous chemicals that company employees may be exposed to.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS050 Training Requirements
HS051 Tailgate Safety Meetings
HS500 OSHA Regulated Toxic and Hazardous Chemicals
OSHA 29 CFR 1910.1200

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Employee Request for MSDS
3. HAZCOM and Right-to-Know Standards Employee Training Record

ATTACHMENT 1
HAZARD COMMUNICATION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*				
		Purchaser	Receiver	Affected Employee	Local Health and Safety Representative	Vice President, Health and Safety
Understand and Comply With State and/or Local Regulations	1.0				X	
Issuance, Revision, and Maintenance of Procedure	3.1					X
Review and Understand This Procedure	5.0	X	X	X	X	
Establish, Update, and Revise MSDS Binder	5.1				X	
Request MSDSs for Procured Chemicals	5.2	X				
Initial Review of MSDSs	5.2				X	
Implement Requirements For Company Manufactured, Imported, or Distributed Chemicals	5.2					X
Review Incoming Shipments for Hazard Labeling/MSDS	5.3		X			
Request Missing MSDSs From Manufacturer or Distributor	5.4		X			
Provide HAZCOM Training	5.5				X	
Receive HAZCOM Training	5.5			X		
Obtain Information on Proprietary Chemicals	5.6					X
Transmit MSDSs to Contractors	5.7				X	
Obtain MSDSs From Other Entities	5.7				X	

ATTACHMENT 2

EMPLOYEE REQUEST FOR MATERIAL SAFETY DATA SHEET (MSDS)

Employee Name: (Please print) ______________________________

Employee Number: ______________________________

Job Title/Location: ______________________________

Department/Work Area: ______________________________

I am requesting a copy of the MSDS(s) for the following chemical(s):

(Chemical name, Common name, Trade name)

1. ______________________________
2. ______________________________
3. ______________________________

Signature ______________________________ Date

I have received a copy of the above MSDS(s) I requested.

Signature ______________________________ Date

cc: Local Health and Safety Representative

ATTACHMENT 3

HAZARD COMMUNICATION AND RIGHT-TO-KNOW STANDARDS EMPLOYEE TRAINING RECORD

	INITIAL:
1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), their use and location, and the procedures to obtain copies.	
2. I have been informed that some of my work may involve exposure to toxic substances, the hazards of which will be reviewed with me in tailgate safety meetings or site-specific training.	
3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access.	
4. I understand that the company must act upon a request in a reasonable amount of time so as to avoid interruption of normal work operations.	
5. I have been provided access to the applicable regulations governing hazard communication, and access to employee exposure and medical records.	

PRINT NAME: ______________________________

SIGNATURE: ______________________________

EMPLOYEE NUMBER: ______________________________

DATE: ______________________________

PROCEDURE

Subject: PRESSURIZED WATER CLEANING AND CUTTING EQUIPMENT

1.0 PURPOSE AND SUMMARY

This procedure covers the personnel requirements, operator training, operating procedures, and recommended equipment performance/design for the proper operation of all types of pressure water jet cleaning and cutting equipment as normally used by industries concerned with construction, maintenance, repair, cleaning, cutting, and demolition work.

The term "high-pressure water jetting" covers all water jetting operations, including the use of additives or abrasives at pressures above 1000 psig.

Any person required to operate or maintain pressure water jetting equipment shall have been trained and have demonstrated the ability and knowledge to do so in accordance with the original equipment manufacturer's instructions, specifications, and training programs.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The National Director, Health & Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Dump System

The discharge orifice operator-controlled, manually operated device or system that reduces the pressure to a level that yields a pressure flow at the nozzle that is considerably below the risk threshold.

High-Pressure Water Cleaning

The use of high-pressure water, with or without the addition of other liquids or solid particles, to remove unwanted matter from various surfaces, where the pressure of the liquid jet exceeds 1000 psig at the orifice.

Warning: The limit of 1000 psig does not mean that pressures below 1000 psig cannot cause injury or require any less attention to the principles of this practice. Adequate precautions, similar to those of this practice, are required at all pressures.

High-Pressure Water Cutting

The use of high-pressure water, with or without the addition of other liquids or solid particles, to penetrate into the surface of a material for the purpose of cutting that material, where the pressure of the liquid jet exceeds 1000 psig at the orifice.

Hose Assembly

A hose with safety coupling attached in accordance with manufacturer's specifications.

Lance

A rigid metal tube used to extend the nozzle from the end of the hose.

Lancing

An application whereby a lance and nozzle combination is inserted into, and retracted from, the interior of a pipe or tubular product.

Moleing

An application whereby a hose fitted either with a nozzle or with a nozzle attached to a lance is inserted into, and retracted from, the interior of a tubular product. It is a system commonly intended for cleaning the internal surfaces of tubes, pipes, or drains. It can be self-propelled by its backward-directed jets and is manufactured in various shapes, sizes, and combinations of forward- and backward-directed jets.

Nozzle

A device with one or more openings where the fluid discharges from the system. The nozzle restricts the area of flow of the fluid, accelerating the water to the required velocity and shaping it to the required flow pattern and distribution for a particular application. Combinations of forward and backward nozzles are often used to balance the thrust. Such nozzles are commonly referred to as tips, jets, orifices, etc.

Operator
A person who has been trained in accordance with the original manufacturer's instructional training program and has been qualified through demonstrating the knowledge, experience, and ability to perform the assigned task.

Operator Trainee
A person not fully qualified due to the lack of sufficient knowledge or experience, or both, to perform the assigned task without supervision.

Pressure Water Jet System
Water delivery systems that have nozzles or other openings whose function is to increase the speed of liquids that may cause injury. Solid particles or additional chemicals may also be introduced, but the exit in all cases will be in a free stream. The system shall include the pumps (pressure-producing devices), hoses, lances, nozzles, valves, safety devices, and personal protective equipment, as well as any heating elements or injection systems, attached thereto.

Shotgunning
An application whereby a lance or nozzle combination can be manipulated in virtually all planes of operation.

5.0 TEXT

This procedure is intended to provide guidance on the proper operation of pressure water jet cleaning and cutting equipment.

This procedure is also applicable at lower pressures at which there is foreseeable risk of injury.

All equipment shall be operated in a manner consistent with the manufacturer instructions for the specific model of equipment to be used. Such instructions and manuals shall be kept in a waterproof compartment with the equipment. (NOTE: Rental equipment shall not be accepted without the manufacturer's manual.)

5.1 Qualified Operators

Only personnel who have undergone a proper training program and who have demonstrated the knowledge and skill, and gained the experience to perform all likely assigned tasks shall operate water jetting equipment. They may also supervise the training of new operators.

5.2 Training

Before being assigned to their first water jetting jobs, associates shall receive proper training. A core module for pressurized water systems is available from the Training Department. This shall be supplemented with site-specific, hands-on training per the manufacturer's instructions for the specific equipment in use. Training shall cover the following topics.

5.2.1 Cutting Action. The cutting action of a water jet and the potential hazard it poses to the human body shall be demonstrated through the use of audiovisual aids or actual use of equipment (by cutting through a piece of lumber, a concrete block, etc.).

5.2.2 System Operation. The operation of water jetting systems shall be explained by pointing out potential problems and proper corrective actions.

5.2.3 Operating Pressure. The need to operate equipment at or below the manufacturer's recommended working pressure shall be stressed.

5.2.4 Control Devices. The operation of all control devices shall be explained. The importance of not tampering with any control devices, as well as the importance of keeping them in proper working order, shall be stressed.

5.2.5 Equipment Maintenance. The importance of the proper and timely care and maintenance of water jetting equipment shall be presented. Instructions shall be provided on the procedures to follow in maintaining equipment and when the equipment must be returned for care by more qualified associates.

Stress that equipment shall not be repaired, or connections tightened, when the unit is in operation or the pump is running.

5.2.6 Valve Maintenance. Point out that valves and seating surfaces in pressure regulating devices encounter high wear during water jetting. These items require frequent inspections, maintenance, and/or replacement to ensure proper operation.

5.2.7 Hose. The proper method of identifying and connecting hoses, including laying out without kinks, protecting hoses from excessive wear, identifying a worn or unsafe hose, and proper tools to use on couplings and fittings shall be explained. Fittings and couplings on hoses shall not be tightened or tampered with while the hose is pressurized. Safety connectors (whipchecks) should be used across all hose connections.

5.2.8 Stance. The proper stance for sound footing and how to use the various devices for lancing, shotgunning, and moleing shall be demonstrated. The trainee, under close supervision, shall be trained to use the various devices while the unit is slowly pressurized and is operating at its normal working capacity.

5.2.9 Proficiency. Personnel shall demonstrate knowledge and skill in the proper operation of equipment through practical applications before performing indirectly supervised work.

5.3 Personal Protective Equipment

The minimum personal protective equipment (PPE) shall be explained. Instructions shall be given as to when and how specific clothing and other types of protective devices shall be worn according to the type of work performed, locations, etc.

5.3.1 **Compliance.** All applicable recommended practices and regulations, instructions, and warnings covering PPE shall be followed as prescribed by the original equipment manufacturer's programmed instructional material.

5.3.2 **Head Protection.** All operators shall wear hard hats with attached face shields.

5.3.3 **Eye Protection.** Suitable eye protection (adequate for the purpose and of adequate fit on the person) shall be provided to all operators of pressure water jetting equipment and must be worn within the working area. Where liquids liable to cause eye damage (see Material Safety Data Sheets) are encountered, it is necessary to use either a combination of visor and impact-resistant goggles, or a full hood with shield.

5.3.4 **Body Protection.** All operators shall be supplied with suitable waterproof clothing and jet-resistant PPE (i.e., foot and leg guards) having application for the type of work being undertaken. Garments shall provide full protective cover to the operator, including arms. Liquid- or chemical-resistant suits shall be worn where there is a reasonable probability of injury (see Material Safety Data Sheets) that can be prevented by such equipment.

5.3.5 **Hand Protection.** Adequate hand protection shall be supplied to all operators and shall be worn when there is a reasonable probability of injury that can be prevented by such equipment. (See original equipment manufacturer specifications.)

5.3.6 **Foot and Leg Protection.** All operators shall be supplied with waterproof boots with steel toecaps and shanks. **Metatarsal guards and leg guards shall be used by the jetting gun operators.**

5.3.7 **Hearing Protection.** Pressure water jetting operations may produce noise levels in excess of 90 dB(A). Suitable ear protection issued in accordance with the recommended practices of the original equipment manufacturer must be worn. Provision shall be made for regular inspection and maintenance, including daily cleaning of hearing protection devices that are of the reusable type. All personnel and operators shall receive instruction in the correct use of ear protectors such that noise exposure lies within the limits as specified by the original equipment manufacturer's instructions.

5.3.8 **Respiratory Protection.** A respiratory protection program shall be implemented where there is a reasonable probability of injury that can be prevented by such a program.

5.3.9 Equipment Limitations. It should be recognized that some protective equipment may not necessarily protect the operator from injury by direct high-pressure water jet impact. Shields and guards shall be used as provided in the original equipment operator's instructions and training programs to prevent any injury.

5.4 Pre-operating Procedures

5.4.1 Planning. Preplan each job. Follow the steps outlined in the original manufacturer's instructions and programmed training materials. Personnel familiar with the item to be cleaned, the material to be cut, and the work environment shall meet with the personnel that will be performing the work and outline potential hazards of the work area, environmental problems, safety standards, and emergency aid procedures.

5.4.2 Checklist. Use the manufacturer's checklist, or listing of critical items, to ensure that the proper equipment selection is followed (see Attachment 2).

5.4.3 Dump Valve. All systems shall incorporate at least one fluid shut-off or dump device. The <u>orifice operator</u> must always be able to shut down the water jet by releasing pressure on the trigger, switch, or foot valve pedal.

5.4.4 Warning Barriers. Erect suitable barriers to encompass the hazard area and post signs to warn personnel they are entering a hazardous area. The perimeter should be outside the effective range of the jet wherever possible. Barriers may be of rope, safety tape, barrels, etc., as long as they give an effective warning and are highly visible.

5.4.5 Hook-ups. Hose shall be arranged so that a tripping hazard does not occur. Support hoses, pipes, and fittings to prevent excessive sway or wear, or both, created by vibration or stress on the end connections when laid on the ground, over sharp objects or on vertical runs, shall be used. Check all hoses for evidence of damage, wear, or imperfections. The check shall be made periodically during the operation.

5.4.5.1 Fittings. Clean and lubricate all fittings before installing in the system. Be sure all fittings, hoses, and nozzles are fit for the purpose.

5.4.5.2 Pre-flushing. Flush the system completely with sufficient water to remove any contaminants before installing the nozzle.

5.4.5.3 Nozzles. Remove nozzles and check all orifices for any blockage or damage, or both, or for imperfections.

5.4.5.4 Electrical Equipment. Any electrical equipment in the immediate area of the operation that presents a hazard to the operator shall be de-energized, shielded, or otherwise made safe. GFCIs shall be used for any necessary power hook-ups.

5.5 Operational Procedures

5.5.1 **Work Area.** Isolate the workpieces/items to be jetted from any unprotected areas to a protected pressure water jetting area. Cutting or cleaning in place or adjacent to the installed position can be done with the necessary clearance and permission of the occupier and equipment/facility owner.

5.5.2 **Area Limits.** Area limits applicable to the cutting or cleaning operations shall be defined by barriers and should be marked with notices to warn against access to other personnel and specific hazards present. Suitable barriers shall be an approved form of hazard warning, rope, or tape, as a minimum. Alternatively, a suitable barrier shield is acceptable at any reasonable distance. Notices should read "Danger - Keep Clear, Pressure Water Jetting in Operation - Severe Injury May Result", or other suitable wording.

5.5.3 **Corrosive Materials.** Where there is a possibility of encountering corrosive or toxic material, the general contractor or employer or owner shall be requested to inform the person in charge of pressure water jetting of any precautions that may be necessary, including the collection and disposal of waste materials.

5.5.4 **Work Surface.** Operators should have good access to the workpiece, safe walking and working surfaces, and secure footing. The work area should be kept clear of loose items and debris to prevent tripping and slipping hazards.

5.5.5 **Unauthorized Access.** Prevent access by unauthorized persons into the area where pressure water jet cleaning or cutting, or both, is taking place. The area shall be secured as described in Section 5.5.2. The perimeter should be outside the effective range of the jet wherever possible.

5.5.6 **Approaching the Operator.** Personnel having reasons to enter the pressure water jet cleaning and cutting area must wait until the jet is stopped and their presence is known. Personnel wishing to have the jet stopped shall approach a team member other than the jet operator. The jet operator shall not be distracted until the jet has been stopped.

5.5.7 **Side Protection.** Suitably placed side shields shall be provided to safeguard personnel and equipment against contact with grit or solids removed by the jet.

5.5.8 **Pressurizing the System.** Increase pressure slowly on the system while it is being inspected for leaks or faulty components, or both. Repair or replace components only when the equipment is properly locked out and tagged. The system shall be depressurized, shut down, and the key removed for repairs.

5.5.9 Team Operations. In jetting operations a minimum of two persons, one at the pump and one at the orifice or gun, shall be employed at all times.

5.5.10 Supervision. All pressure water jetting operations shall be controlled by a supervisor who has been trained in accordance with the instructions of the original equipment manufacturer in all aspects of the jetting operation.

5.5.11 Number of Operators. The operators of the pressure water jetting equipment should consist of two or more operators according to the equipment being used and the nature of the job. These operators shall work as a team, with one member designated in charge. The operator of the gun or lance shall take the lead role while jetting is in progress.

5.5.12 Gun Operator. One operator from the team shall hold the lance, gun, or delivery hose with the nozzle mounted on it. That operator's primary duty is to direct the jet.

5.5.13 Second Operator. The second operator of the team shall attend the pump unit, keep close watch on the first operator for signs of difficulty or fatigue, and watch the surrounding area for intrusion by other persons or unsafe situations. If required, the operator will shut off the pressure until any unsafe acts or conditions have been corrected and it is safe to continue.

Warning: Exercise caution in shutting off the pressure rapidly, as this can cause loss of footing by the gun operator.

5.5.14 Additional Operators. Additional operators are required in the following circumstances:

- To assist the first operator with the handling of the lance if it is too long or too heavy for one person; or
- To provide communication if the lance operator is out of sight of the pump unit operator.

5.5.15 Job Rotation. The team members should rotate their duties during any job to minimize fatigue to the operator holding the lance or gun.

5.5.16 Team Leader. The team leader is responsible for basic equipment checks, the preparation of the working area for safe operation, and for obtaining a permit to work (if applicable).

5.5.17 Code of Signals. Before starting a jetting operation, the team members, one of who must be in charge, shall agree on signals to be used during the operation of the equipment.

5.5.18 **Fitness.** The operator and other team members shall be capable of performing the required operations safely. All shall be capable of speaking and reading the instructions and warnings in the language of their place of work.

5.6 Single Person Operation

Single person operation is allowed where the pressure does not constitute a hazard to personnel. Single person operations are prohibited at operating pressures exceeding 1000 psig and may be deemed unsafe at lower pressures due to jobsite conditions. (**NOTE:** All HAZWOPER operations are required to use the buddy system.)

5.6.1 **Single Operator Guidelines.** All other recommendations pertaining to team operations shall apply.

5.7 Shotgunning

5.7.1 **Controls.** The person operating the nozzle shall have direct control of the dump system.

5.7.2 **Attendance.** The pressurized system shall never be left unattended.

5.7.3 **Multiple Operation.** When more than one shotgunning operation is being performed within the same area, install a physical barrier or maintain adequate spacing between operators to prevent the possibility of injury from the pressure water.

5.7.4 **Target Holding.** Never manually hold objects to be cleaned.

5.7.5 **Connection Protection.** The point where the hose connects to the gun shall be shrouded by a protective device such as a heavy duty hose, shoulder guard, and the like, to prevent injury to the operator should the hose, pipe, or fitting rupture.

5.7.6 **Minimum Length.** When used, the minimum length of the shotgun lance extension shall be 4 feet (1.2 mm) from the triggering device to the nozzle.

5.7.7 **Hose Protection.** Use steel-braided hoses on air-operated, fail-safe systems to keep the system from being activated by someone stepping on the hose or running over it.

5.8 Moleing or Flex Lancing

5.8.1 **Control.** The operator shall have direct control of the dump system.

5.8.2 **Reversing.** A positive method shall be used to prevent the nozzle from reversing direction inside the item being cleaned. Safety guards for this purpose shall be used.

5.8.3 **Retrojets.** During manual operations, the entrance to a line or pipe shall not be cleaned with a nozzle containing back jets without adequate shielding.

5.8.4 **Clearance.** The clearance between the outside diameter of the hose, lance, and nozzle assembly and the inside wall of the item being cleaned shall be sufficient to allow adequate washout of water and debris.

5.8.5 **Pressurization.** During manual operation, insert the nozzle into the tube prior to pressurizing. Conversely, depressurize the system before removing the nozzle from the tube.

5.8.6 **End Identification.** Hoses shall be conspicuously marked no closer than 24 inches (600 mm) from the nozzle to warn the operator of the nozzle location.

5.8.7 **Nozzle Support.** Where the length of the nozzle and rigid coupling is less than the inside diameter of the pipe, a length of rigid pipe of not less than the diameter of the pipe being cleaned shall be fitted directly behind the nozzle, or a suitable safety shield shall be provided to protect the operator. This is to prevent the nozzle from turning around 180 degrees and doubling back towards the operator. Specific safety guards shall be used for this purpose.

5.9 Ridge Lancing

5.9.1 **Control.** The operator inserting the nozzle shall have direct control of the dump system.

5.9.2 **Clearance.** The clearance between the outside diameter of the lance and nozzle and the inside wall of the item being cleaned shall be sufficient to allow adequate washout of water and debris.

5.9.3 **Pressurization.** When under manual operation the nozzle shall be inserted into the tube prior to pressurizing. Conversely, the system shall be depressurized before removal of the nozzle from the tube, unless proper shielding is provided.

5.9.4 **Shields.** When lancing tubes with a rigid lance, a guard shall be installed around the lance to prevent a lance nozzle from being inadvertently withdrawn and causing injury.

5.10 Additives

Any water additive (chemical, detergent, or solid particle) shall be used in accordance with the manufacturer�s recommendations.

5.11 Proper Operation

5.11.1 **Start-up.** Do not start the pump unit and bring it up to pressure unless each team member is in his designated position, the nozzle is held in or directed at the workpiece, and the lance or gun is securely held.

5.11.2 Adjustments. Apart from operational procedures, no attempt shall be made to perform maintenance or adjust any nut, hose connection, fitting, etc., while the system is under pressure. Stop the pumps, discharge any pressure in the line, and remove the key prior to making any such adjustment. Take care to release the pressure in the dry shut-off gun and the line when the unit is switched off.

5.11.3 Equipment Malfunction. If for any reason the water flow does not shut off when the trigger or foot pedal is released, cease work until the item has been serviced, repaired, or changed by properly trained personnel. Equipment shall be shut down, depressurized, and the key removed prior to making repairs.

5.11.4 Reaction Force. The operators shall be allowed to experience the reaction force of the jet progressively until the required operating pressure is reached. Use the lowest pressure compatible with the work to be done. Do not adjust the pressure without the operator being aware of this operation.

5.11.5 Effect of Line Pulses. Operators shall be made aware of the reactive effect of pressure in the line that can transmit a severe jolt to the operator when the dump valve or dry shut-off valve is operated. To minimize this effect, keep total hose lengths as short as possible. Damping devices shall be introduced into the system in accordance with the original equipment manufacturer's designs or instructions.

5.11.6 Thermoplastic Hoses. Thermoplastic hose shall not be used for water jetting unless specifically designed for this purpose.

5.11.7 Operator Position. While operating, the team members shall be safely positioned. Stop the jetting if any person encroaches into the working area.

5.11.8 Work Stoppage. Stop work in the following cases:

- In the event that leaks or damage become apparent;
- If any person becomes aware of any change in conditions or of any hazards being introduced or existing;
- If plant or work alarms are sounded; or
- If any of the practices in this procedure are not being followed.

5.11.9 Hose Protection. Protect all hoses from being run over and crushed by vehicles, fork lift trucks, and the like.

5.11.10 Back Thrust. The back thrust from a linearly directed jet can be calculated from the equation:

$$B = 0.052\ Q(P)0.5$$

where:

B = Back thrust, lb(kg)
Q = Flow rate, gal/min (or metric equivalents), and
P = Jet pressure (psi)

It is not recommended that one person be required to withstand a back thrust of more than one third of his or her body weight for any extended period of time.

5.12 Use of Lances and Nozzles

5.12.1 **Lances.** Lances that are rigid or semirigid, having nozzles fitted to them with any combination of forward, backward, or 90 degrees angle jets, shall be used with either a dump system or dry shut-off control valve. When a flexible lance or nozzle mounted on a hose is in use, do not operate the jet at pressure unless the nozzle is properly positioned inside the workpiece or the operator is protected by screens or proper shielding from the rear-facing jets. If necessary, clean the lead-in to the workpiece by other methods.

5.12.2 **Flexible Lances.** Flexible lances, used to clean pipes where the inside diameter of the pipe is not small enough to prevent the lance from turning back on itself, shall have a piece of rigid straight tube, slightly longer than the diameter of the pipe, fitted immediately behind the nozzle to prevent this from happening.

5.12.3 **Distance Indicator.** When using an assembly that allows the nozzle to enter the workpiece with restricted visibility, clearly mark the lance, hose, or floor in a manner that enables the operator to judge how far the nozzle is in the workpiece before pressure is applied and, conversely, so that pressure is released before the apparatus is completely withdrawn from the workpiece.

5.12.4 **Lance Length.** The length of a rigid lance or combination of lances shall be such that the operator can maintain control at all times.

5.12.5 **Jet Pressure.** Operators shall select the nozzle and minimum operating pressure to allow effective and efficient jetting.

5.12.6 **Improper Use.** Should an operator enter a manhole or access port for any purpose (with the jetting machine turned off), the hose shall not be used to support his weight when climbing up or down.

5.12.7 **"T" Pieces.** A "T" piece or nozzle carrier "T" (devices for producing two equal and opposite jets at the end of the land and at right angles to the normal flow) shall inserted into a tube or vessel, or between two surfaces, before the system is pressurized. This is necessary to ensure that should one jet be larger than the other, or one jet become blocked or partially blocked, the operator of the lance will not be spun out of control. When a "T" piece is used to provide a balancing jet on a long lance to clean a single surface, it is not always possible to check for equal thrust from both jets in the above described manner; therefore, check these lances by progressive pressure increases.

Caution: This shall also apply to any form of multi-jet nozzle having a radial component.

5.13 Health and Safety Plan

The HS professional for the job shall include appropriate assessment and hazard control information in the project HASP.

6.0 EXCEPTION PROVISIONS

Exceptions shall be per the requirements of Shaw E & I Procedure HS013**.**

7.0 CROSS REFERENCES

ASTM E-1575-93, *Standard Practice for Pressure Water Cleaning and Cutting*

Water Jet Technology Association's *Recommended Practices for the Use of Manually Operated High Pressure Water Jetting Equipment*

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Reservice and Operational Checklist for Pressure Water Jet Cleaning and Cutting Equipment

ATTACHMENT 1
PRESSURIZED WATER CLEANING AND CUTTING EQUIPMENT

Responsibility Matrix

Action	Procedure Section	*Responsible Party*			
		Location Manager	**Site Supervisor**	**Project Manager**	**HS**
Provide training	5.2	X		X	
Job set-up/checklist	5.4.2		X	X	
Incorporate requirements in HASP	5.13			X	X

ATTACHMENT 2 - RESERVICE & OPERATIONAL CHECKLIST FOR PRESSURE WATER JET CLEANING AND CUTTING EQUIPMENT

The following information shall be verified before starting work:

ITEM #	DESCRIPTION	⊗
1.	Date (Print):________________________	
2.	Location:________________________	
3.	Equipment being cleaned (Print):________________________	
4.	Is the area, including the other end of unit being cleaned, properly secured?	
5.	Have precautions been taken to protect all electrical equipment?	
6.	Is there any hazard to personnel resulting from damage to the equipment such as release of corrosive chemicals, flammable liquids, gases, or the like?	
7.	Are all fittings of the correct pressure rating?	
8.	Are all hoses of the correct pressure rating?	
9.	Are all fittings in good operating condition?	
10.	Are all hoses in good operating condition?	
11.	Are all nozzles free from plugging and in good operating condition?	
12.	Have precautions been taken to prevent line-mole reversal?	
13.	Is the filter on the pump suction clean and in good operating condition?	
14.	Is there an adequate water supply?	
15.	Have precautions been taken against freezing?	
16.	Do all personnel have proper personal protective equipment for this job?	
17.	Do all personnel have proper training for this job?	
18.	Are all personnel qualified to perform this work?	
19.	Has the complete hook-up been flushed and air removed from the system prior to installing the nozzle?	
20.	Has hook-up, including pipes, hoses, and connections, been pressure tested with water at the maximum operating pressure?	
21.	Is the dump system operating properly (will it dump when released)?	
22.	Are all control systems operational?	
23.	Is the location of emergency medical aid known?	

PROCEDURE

Subject: HEAT STRESS

1.0 PURPOSE AND SUMMARY

This procedure establishes the guidelines to protect employees from the effects of heat related illness. It describes the four major types of heat-induced illnesses, methods of prevention, types of treatment, and includes discussions on the monitoring of heat stress situations.

Some clients may have monitoring requirements that differ from those contained in this procedure. In such circumstances, the more protective monitoring requirements will be followed.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Acclimatization - Series of physiological and psychological adjustments that occur in an employee during initial exposures to hot environmental conditions that increase the employee’s tolerance to elevated work environment temperature.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Maximum Heart Rate - Amount of work (beats) per minute a healthy person’s heart can be expected to safely deliver. Maximum heart rate (MHR) is calculated by subtracting an employee’s age from 200.

5.0 TEXT

Adverse climatic conditions are important considerations in planning and conducting site operations. High ambient temperature can result in deleterious health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal illness, increased accident probability, etc., to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment places employees at considerably higher risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses, regular monitoring and other preventive precautions are vital.

5.1 Signs, Symptoms, and Treatment

5.1.1 Heat Rash

Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat soaked clothing.

Signs and Symptoms: The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced.

Treatment: Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

5.1.2 Heat Cramps

Heat cramps are caused by profuse perspiration with inadequate electrolytic fluid replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can cause painful muscle spasms and pain.

Signs and Symptoms: Muscle spasms and pain in the extremities and abdomen.

Treatment: Remove employee to a cool place and give sips of water or an electrolytic drink. Watch for signs of heat exhaustion or stroke.

5.1.3 Heat Exhaustion

Heat exhaustion is a mild form of shock caused by increased stress on various organs to meet increased demand to cool the body. Onset is gradual and symptoms should subside within one hour.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; fatigue.

Treatment: Remove employee to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continually to remove heat by convection. CAUTION: Do not allow the affected person to become chilled ☞ treat for shock if necessary.

5.1.4 Heat Stroke

Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. **THIS IS A MEDICAL EMERGENCY!**

Signs and Symptoms: Red, hot, dry skin (skin may be wet from previous perspiration particularly when evaporation-preventing clothing is worn); body temperature of 105 degrees Fahrenheit (☛F) or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse.

Treatment: Heat stroke is a true medical emergency. Transportation of the victim to a medical facility must not be delayed. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in a cool water bath (however, be careful not to over-chill the victim once body temperature is reduced below 102☛F). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

5.2 Prevention

The implementation of preventative measures is the most effective way to limit the effects of heat-related illnesses. During periods of high heat, adequate liquids must be provided to replace lost body fluids. Replacement fluids can be a 0.1 percent salt water solution, a commercial mix such as Gatorade, or a combination of these with fresh water. The replacement fluid temperature should be kept cool, 50 degrees F to 60 degree F, and should be placed close to the work area. Employees must be encouraged to drink more than the amount required to satisfy thirst. Employees should also be encouraged to salt their foods more heavily during hot times of the year.

Cooling devices such as vortex tubes or cooling vests can be worn beneath impermeable clothing. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

All workers are to rest when any symptoms of heat stress are noticed. Rest breaks are to be taken in a cool, shaded rest area. Employees shall remove chemical protective garments during rest periods and will not be assigned other tasks.

All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress and the harmful effects of excessive alcohol and caffeine consumption.

5.3 Monitoring

The initiation of heat stress monitoring will be required when employees are working in environments exceeding 90 degree F ambient air temperature. If employees are wearing impermeable clothing, this monitoring will begin at 78 degree F. There are two general types of monitoring that the health and safety representative can designate to be used: wet bulb globe temperature (WBGT) and physiological. Attachment 2 will be used to record the results of heat stress monitoring.

5.3.1 Wet Bulb Globe Temperature

The WBGT index is the simplest and most suitable technique to measure the environmental factors which most nearly correlate with core body temperature and other physiological responses to heat. When WBGT exceeds 25.9 degree C (78 degree F), the work regiment in Table 2 of the section “Heat Stress” in the latest edition of the American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Value (TLV) Booklet should be followed.

5.3.2 Physiological

Physiological monitoring can be used in lieu of or in addition to WBGT. It is anticipated that this monitoring can be self-performed once the health and safety representative demonstrates appropriate techniques to affected employees. Since individuals vary in their susceptibility to heat, this type of monitoring has its advantages. The two parameters that are to be monitored at the beginning of each rest period are:

- Heart Rate - Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate of any individual exceeds 75 percent of their calculated maximum heart rate (MHR = 200 - age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75 percent of their calculated maximum heart rate.

- Temperature - Each individual will measure his/her oral temperature with a disposable thermometer for one minute as early as possible in the first rest period. If the temperature exceeds 99.6 degrees F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same.

- An individual is not permitted to return to work if his/her temperature exceeds 100.4 degrees F

5.4 Training

Employees potentially exposed to heat stress conditions will be instructed on the contents of this procedure. This training can be conducted during daily tailgate safety meetings.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS051 Tailgate Safety Meetings

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Heat Stress Monitoring Record

ATTACHMENT 1
HEAT STRESS

Responsibility Matrix

Action	Procedure Section	*Responsible Party* Vice President, Health and Safety	Project Supervisor	Health and Safety Representative
Issuance, Revision, and Maintenance of Procedure	3.1	X		
Conduct Monitoring	5.3			X
Inform Employees About Procedure	5.4		X	X

ATTACHMENT 2
HEAT STRESS MONITORING RECORD

Project/Location ______________________________ Date ______________

Employee Name	Initial Reading Time	First Work Period Time		Second Work Period Time		Third Work Period Time		Fourth Work Period Time		Fifth Work Period Time		Sixth Work Period Time	
	WBGT (°F)	WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)	
	Air Temp. (°F)	Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)	
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.

PROCEDURE

Subject: COLD STRESS

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the guidelines necessary to protect employees from the adverse health effects caused by exposure to low temperature environments.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The responsibility matrix is Attachment 1.

4.0 TEXT

Most cold related worker fatalities have resulted from failure to escape low air temperatures, or from immersion in low temperature water. Employees should be protected from exposure to cold so that their deep core temperature does not fall below 96.8 degrees Fahrenheit. Core body temperatures below this level will likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

4.1 Signs and Symptoms of Cold Stress

Several factors increase the harmful effects of cold including, being very young or old, wet clothing, having wounds or fractures, smoking, drinking alcoholic beverages, fatigue, emotional stress and certain diseases and medications. The two most prominent adverse effects from exposure to cold temperatures are frostbite and hypothermia. Treatment for cold related injuries should be administered by a person qualified in first aid or a professional medical provider.

4.1.1 Frostbite. Frostbite is the most common injury caused by exposure to cold temperatures. It occurs when cells of the body freeze restricting blood flow and causing tissue damage. The first sign of frostbite is slightly flushed skin which then changes to white or grayish yellow and finally grayish blue. Pain is sometimes initially felt but is often followed by a cold numb feeling.

4.1.2 Hypothermia. Hypothermia is the most severe form of cold stress and results from a drop in the body's core temperature. The initial signs include; shivering, numbness, confusion, weakness, impaired judgement, impaired vision, and drowsiness. Hypothermia victims typically progress through five stages of the condition including; (1) shivering, (2) apathy, (3) loss of consciousness, (4) decreasing pulse and breathing rate, and (5)death.

4.2 Precautionary Measures

It is recommended that employees wear insulated clothing to maintain core temperatures above 96.8 degrees F when working in air temperatures below 40 degrees F. This protective clothing may include but is not limited to:

- Insulated suits, such as whole-body thermal underwear
- Wool or polypropylene socks
- Insulated gloves and boots
- Insulated head cover, such as knit caps, hard hat liners, etc.

When conducting work in air temperatures below 35 degrees F, the following practices shall be followed:

- If the clothing of an employee is expected to become wet, the outer layers of clothing must be impermeable to water.
- If an employees underclothing becomes wet it must be changed immediately. If the clothing becomes wet from sweating, the employee may finish the task which caused the sweating before changing into dry clothing.
- Employees will be provided a warm area (65 degrees F or above) to change from work clothing into street clothing and for breaks.
- Hot liquids, such as soups, warm drinks, etc. shall be provided in the break area. The intake of caffeine containing products shall be discouraged due to their diuretic and circulatory effects.

- If appropriate, approved space heaters may be provided in the work area to warm the hands, feet, etc.

- The buddy system shall be practiced. Any employee observed with signs of cold stress shall immediately proceed to the break area.

- Employees will be reminded to layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.

- Avoid overdressing when going into warm areas or when performing activities which are strenuous. This could potentially lead to heat stress situations.

- Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist.

- Employees handling liquids with high evaporation rates (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing with the liquids because of the added danger of cold injury caused by evaporative cooling.

- Work shall be arranged in such a way that sitting still or standing for long periods is minimized.

- If the air temperature is 20 degrees F or below the hands shall be protected by mittens or gloves prior to contact with cold surfaces such as metal, etc.

Air temperature is not the only factor to be considered while evaluating cold stress situations. Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed the greater the risk of experiencing cold related injuries. For exposed skin, continuous exposure should not be permitted when the air speed and temperature result in an equivalent chill temperature of –25 degrees F of less. The wind chill table provided in attachment two can be used to help assess hazardous conditions attributable to wind chill effects.

4.3 Training

Training on the contents of this procedure will be conducted during tailgate safety meetings held at project or office locations where employees are exposed to cold temperatures. Topics to be discussed during this training will include:

- Proper rewarming procedures and first aid treatment of cold related cases
- Proper clothing practices
- Eating and drinking habits
- Recognition of signs and symptoms of cold stress
- Safe cold weather work practices.

5.0 EXCEPTION PROVISIONS

Variances may be requested as described in procedure HS013; Health and Safety Procedure Variances.

6.0 CROSS REFERENCES

Shaw Environmental & Infrastructure, Inc. (Shaw E & I) Procedure HS051-Tailgate Safety Meetings

Shaw E & I Procedure HS600-Personal Protective Equipment

Threshold Limit Values and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists.

Standard First Aid Workbook, American Red Cross

7.0 ATTACHMENTS

1. Responsibility Matrix
2. Windchill Table

ATTACHMENT 1
COLD STRESS

Responsibility Matrix

Action	Procedure Section	Employee	Local HS Representative	Vice President Health and Safety
Issuance, revision and maintenance of this procedure	3.1			X
Provide training	4.2		X	
Receive training	4.2	X		

ATTACHMENT 2

Windchill Table

	Actual Temperature Reading (°F)											
Estimated Wind Speed (mph)	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In under an hour with dry skin. Maximum danger is false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

PROCEDURE

Subject: **HEARING CONSERVATION PROGRAM**

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish guidelines for the company hearing conservation program. Regulatory requirements mandate that the company administer a hearing conservation program whenever employee sound exposures equal or exceed an 8-hour time-weighted average (TWA) sound level of 85 decibels (dB).

Evidence is well established that worker exposure to sound of sufficient intensity and duration can result in hearing damage. This procedure prescribes the control measures required to prevent employee exposure to excessive sound levels and includes provisions for:

- Monitoring of the workplace to determine employee exposures.
- An audiometric testing program which includes baseline and annual audiograms.
- An employee training and information program.
- Description of various control measures that can be used to decrease exposures.
- Providing hearing protection to all affected employees when administrative or engineering controls fail to reduce sound levels to below the action level.
- Recordkeeping requirements.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Action Level - An 8-hour TWA of 85 dB or a dose of 50 percent.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Standard Threshold Shift (STS) - Change in hearing threshold relative to the baseline audiogram of 10 dB or more at 2,000, 3,000, and 4,000 hertz (Hz) in either ear.

5.0 TEXT

5.1 General

The company hearing conservation program will be implemented and protection against the effects of sound exposure will be provided whenever sound levels exceed the action level.

5.2 Monitoring

Monitoring of employee exposures to sound will be conducted whenever it is anticipated that exposure may exceed the action level. This monitoring will be conducted by a qualified individual who, through professional credentials, training, or experience, has the necessary qualifications to specify and use the type of monitoring equipment (area or personal) that will best represent employee exposures. This monitoring will be repeated whenever changes in the work environment lead to the possibility of additional exposures or inadequacy of selected hearing protection. Employees will be provided the opportunity to observe monitoring and will be notified when the results exceed the action level.

Sound level monitoring instrumentation will be operated on the A-weighted scale in slow response mode. Employee sound exposures will be computed in accordance with Attachment 2 and without regard to any attenuation provided by the use of hearing protection.

5.3 Audiometric Testing

Audiometric testing will be provided to all employees exposed at or above the action level. Testing will be in accordance with Procedure HS100, Medical Policies and Procedures.

5.3.1 Baseline Audiogram. Audiometric test results obtained from the pre-hire medical examination will be used as the baseline audiogram. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace sound. Employees will also be notified of the need to avoid high levels of non-occupational sound exposure during this 14-hour period.

5.3.2 Annual Audiograms. Annual audiograms will be conducted for all employees exposed at or above the action level during the preceding year. Each annual audiogram will be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a STS has occurred.

5.4 Employee Training and Information

All employees who are exposed to sound levels above the action level are required to participate in a formal training program. This program will be presented by a health and safety representative and include, as a minimum, the following information:

- The effects of sound on hearing.
- The purpose of hearing protection; the advantages, disadvantages, and attenuation of various types; and instructions on selection, fitting, use, and care.
- The specific nature of operations which could result in exposure to excessive sound levels.
- The purpose of audiometric testing and an explanation of the test procedures.
- The engineering controls and administrative practices associated with the employee's job assignment.

This training program will be repeated annually. Participating employees are required to complete the Hearing Protection Training Completion Record (Attachment 3). This record will be maintained by the company Training Department in Knoxville. In addition, tailgate safety meetings will be periodically used to instruct employees on the need for hearing protection in designated areas.

The project/location manager will make available to affected employees or their authorized representatives a copy of 29 Code of Federal Regulations (CFR) 1910.95 and will also post a copy in the workplace.

5.5 Control Measures

A straightforward method of controlling sound exposure is to examine the problem in terms of its three basic elements including:

- Sound arises from a source;
- Travels over a path; and
- Affects a receiver or listener.

The solution to a given sound problem might require alteration or modification of any or all of these three basic elements including:

- Modifying the source to reduce its sound output;
- Altering or controlling the transmission path to reduce the sound level reaching the listener; or
- Providing the receiver with hearing protection (but only if the sound source or path cannot be controlled).

5.5.1 Sound Control at the Source. Perhaps the best method for controlling sound at its source is the initial equipment selection process. The following summarizes those features that the buyer should look for and steps to be taken in selecting equipment:

- Low-sound certification.
- Advertisement of "quiet" operation, evidence of sound control design.
- Evidence of "lower" and "slower" operating characteristics.
- Conductance of side-by-side sound tests of equipment.
- Request an "on-site" or "in operation" inspection of mechanical equipment before purchase.

Most mechanical devices are complex sound generators. Though it is impractical to discuss all possible solutions to all sound problems, some general control measures and methods have been provided below:

- Reduce impact or impulse sound by reducing the weight, size, or height of fall of impacting mass.

- Reduce speed in machines and flow velocities and pressure in fluid conveyance systems.

- Balance rotating parts to control machinery sound and vibration of fans, fly wheels, pulleys, cams, shafts, etc.

- Reduce frictional resistance between rotating, sliding, or moving parts by frequent lubrication and proper alignment; static and dynamic balancing of rotating parts; and/or correction of eccentricity or "out-of-roundness" of wheels, gears, rollers, pulleys, etc.

- Reduce resistance in air or fluid systems by use of low flow velocities, smooth surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence.

- Isolate vibration elements in machinery; install motors, pumps, etc., on most massive part of machine; use belt or roller drives in place of gear trains; use flexible hoses and wiring instead of rigid piping and stiff wiring; etc.

- Apply vibration damping materials such as liquid mastics; pads of rubber, felt, foam, or fibrous blankets; or sheet metal viscoelastic laminates or composites to vibrating machine surface.

- Reduce sound leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors.

5.5.2 **Sound Control in the Transmission Path.** Another effective way to limit employee exposure to sound is through the use of transmission path controls. These controls may include, but are not necessarily limited to:

- Separation of the sound source and receiver.

- Use of sound absorbing materials on ceiling, floor, or wall surfaces.

- Use of sound barriers and deflectors in the sound path.

- Use of acoustical lining on inside surfaces of passageways, ducts, pipe chases, or electrical channels.

- Use of mufflers or silencers on all gasoline or diesel engines, regardless of size, and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam, or air are discharged.

- Use vibration isolators and flexible couplers where the sound transmission path is structural in character.

5.5.3 **Protection for the Receiver.** When engineering controls fail to reduce sound levels to below the action level, hearing protection will be provided. Hearing protection will be provided at no cost to employees and will be replaced as necessary.

Supervisors will ensure that hearing protection is worn by all employees who are exposed at or above the action level. Employees will be given the opportunity to select their hearing protection from a variety of suitable protection devices that attenuate their exposure to the action level or below. Attenuations are determined by subtracting 7 dB from the noise reduction rating (NRR) of the protector and subtracting the remainder from the TWA sound level.

5.6 Recordkeeping

The company will maintain records of all audiometric test records required by this procedure and retain them for at least the following periods:

- Sound exposure measurement records will be retained for two (2) years.

- Audiometric test records will be retained for the duration of the affected employee�s employment.

All records required by this procedure will be provided upon request to employees, former employees, representatives designated by the individual employee, and any authorized government representative.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS100 Medical Policies and Procedures

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Sound Exposure Computation
3. Hearing Protection Training Completion Record

ATTACHMENT 1
HEARING CONSERVATION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Health and Safety Representative	**Project/Location Manager**	**Vice President, Health and Safety**
Issue, Revise, and Maintain Procedure	3.1			X
Monitor Employee Exposures	5.2	X		
Provide Training	5.4	X		
Make Available/Post 29 CFR 1910.95	5.4		X	

ATTACHMENT 2

SOUND EXPOSURE COMPUTATION

Computation of Employee Sound Exposure

A. Sound dose is computed using Table 1 as follows:

When the sound level is constant over the entire work shift, the sound dose (D), in percent, is given by:

$$D = 100\ C/T$$

Where C is the total length of the work day, in hours, and T is given in Table 1.

B. When the work shift sound exposure is composed of two or more periods of sound at different levels, the total sound dose over the work day is given by:

$$D = 100\ (C_1/T_1 + C_2/T_2 \ldots + C_n/T_n)$$

Where C_n indicates the total time of exposure at a specific sound level and T_n indicates the reference duration for that level as given by Table 1.

C. The eight-hour TWA sound level, in decibels, may be computed from the dose, in percent, by means of the formula:

$$TWA = 16.61 \log_{10} (D/100) + 90$$

For an eight-hour work shift with the sound level constant over the entire shift, the TWA is equal to the measured sound level.

Conversion Between "Dose" and "8-Hour TWA" Sound Level

Sound exposure is usually measured with an audio dosimeter which gives a readout in terms of "dose." Dosimeter readings can be converted to an 8-hour TWA sound level.

In order to convert the reading of a dosimeter into TWA, use Table 2. This table applies to dosimeters that are set to calculate dose or percent exposure according to the relationships in Table 1. So, for example, a dose of 91 percent over an 8-hour day results in a TWA of 89.3 decibels and a dose of 50 percent corresponds to a TWA of 85 decibels.

If the dose as read on the dosimeter is less than or greater than the values found in Table 2, the TWA may be calculated by using the formula:

$$TWA= 16.61 \log_{10} (D/100) + 90$$

Where TWA equals 8-hour TWA sound level and D equals accumulated dose in percent exposure.

Table 1
Permissible Sound Exposure

A-Weighted Sound Level (decibels)	Permitted Duration Per Workday (T) (hours)	A-Weighted Sound Level (decibels)	Permitted Duration Per Workday (T) (hours)
80	32.0	106	0.87
81	27.9	107	0.76
82	24.3	108	0.66
83	21.1	109	0.57
84	18.4	110	0.50
85	16.0	111	0.44
86	13.9	112	0.38
87	12.1	113	0.33
88	10.6	114	0.29
89	9.2	115	0.25
90	8.0	116	0.22
91	7.0	117	0.19
92	6.1	118	0.16
93	5.3	119	0.14
94	4.6	120	0.125
95	4.0	121	0.11
96	3.5	122	0.095
97	3.0	123	0.082
98	2.6	124	0.072
99	2.3	125	0.063
100	2.0	126	0.054
101	1.7	127	0.047
102	1.5	128	0.041
103	1.3	129	0.036
104	1.1	130	0.031
105	1.0		

Table 2
Conversion From "Percent Sound Exposure" or "Dose" To "8-Hour TWA Sound Level"

Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA
10	73.4	104	90.3	260	96.9	640	103.4
15	76.3	105	90.4	270	97.2	650	103.5
20	78.4	106	90.4	280	97.4	660	103.6
25	80.0	107	90.5	290	97.7	670	103.7
30	81.3	108	90.6	300	97.9	680	103.8
35	82.4	109	90.6	310	98.2	690	103.9
40	83.4	110	90.7	320	98.4	700	104.0
45	84.2	111	90.8	330	98.6	710	104.1
50	85.0	112	90.8	340	98.8	720	104.2
55	85.7	113	90.9	350	99.0	730	104.3
60	86.3	114	90.9	360	99.2	740	104.4
65	86.9	115	91.1	370	99.4	750	104.5
70	87.4	116	91.1	380	99.6	760	104.6
75	87.9	117	91.1	390	99.8	770	104.7
80	88.4	118	91.2	400	100.0	780	104.8
81	88.5	119	91.3	410	100.2	790	104.9
82	88.6	120	91.3	420	100.4	800	105.0
83	88.7	125	91.6	430	100.5	810	105.1
84	88.7	130	91.9	440	100.7	820	105.2
85	88.8	135	92.2	450	100.8	830	105.3
86	88.9	140	92.4	460	101.0	840	105.4
87	89.0	145	92.7	470	101.2	850	105.4
88	89.1	150	92.9	480	101.3	860	105.5
89	89.2	155	93.2	490	101.5	870	105.6
90	89.2	160	93.2	500	101.6	880	105.7
91	89.3	165	93.6	510	101.8	890	105.8
92	89.4	170	93.8	520	101.9	900	105.8
93	89.5	175	94.0	530	102.0	910	105.9
94	89.6	180	94.2	540	102.2	920	106.0
95	89.6	185	94.4	550	102.3	930	106.1
96	89.7	190	94.6	560	102.4	940	106.2
97	89.8	195	94.8	570	102.6	950	106.2
98	89.9	200	95.0	580	102.7	960	106.3
99	89.9	210	95.4	590	102.8	970	106.4
100	90.0	220	95.7	600	102.9	980	106.5
101	90.1	230	96.0	610	103.0	990	106.5
102	90.1	240	96.3	620	103.2	999	106.6
103	90.2	250	96.6	630	103.3		

ATTACHMENT 3

HEARING PROTECTION TRAINING COMPLETION RECORD

INITIAL

1. I have been informed about the health hazards associated with exposure to excessive sound levels and its potential effect on hearing. ☐
2. I have been informed about the types of work that may result in exposure to excessive sound levels, and the necessary protective steps to prevent excessive exposure, including engineering controls and administrative practices. ☐
3. I understand the purpose for, proper use, and limitations of hearing protection devices, and I have received instructions on selection, fitting, use, and care of such devices. ☐
4. I have been informed about the purpose of audiometric testing and an explanation of the test procedures. ☐
5. Copies of the applicable regulations governing occupational exposure to excessive sound have been made available to me. ☐

PRINT NAME: ______________________________

SIGNATURE: ______________________________

EMPLOYEE NUMBER: __________________________

DATE: ___________________________________

Please File Completed Forms and Forward a Copy to the Knoxville Training Department

PROCEDURE

Subject: PERSONAL PROTECTIVE EQUIPMENT

1.0 PURPOSE AND SUMMARY

This procedure stipulates that the company will provide the personal protective equipment necessary for employees to perform their work safely, as established by the Health & Safety Department. Special purchasing programs for prescription safety glasses and safety shoes are also described. Head, eye, body, and foot protection are discussed in this procedure. Respiratory and hearing protection are cross referenced to the appropriate company procedures.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

TheVice President of Health & Safety, is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company – All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc (Shaw E & I).

5.0 TEXT

The company will provide suitable personal protective equipment as required for the nature of the job being performed, such as, but not limited to, boots, protective clothing, respirators, face shields, safety eyewear, respirator ophthalmic hanger devices, hard hats, and gloves. This personal protective equipment will be specified by the Health & Safety Department prior to use, subject to an assessment of the hazards to which employees will be potentially exposed. Documentation shall be in the project-specific Health and Safety Plan (HASP) or equivalent document.

Employees shall use HS-approved protective equipment on any task where there is potential exposure to: physical hazards such as equipment operation, objects dropping from above, or flying particles; or exposure to toxic or irritating gases, fumes, vapors, liquids, or other materials which might cause respiratory distress or skin irritation.

Employees shall be trained in the proper use, maintenance, and limitations of protective equipment. Safety equipment shall be replaced when it is damaged, contaminated, or has worn out. Training requirements are summarized in company Procedure HS050.

Employees shall wear hard hats, eye protection, and steel-toed foot protection (chemical resistant when required) at all job sites (excluding field offices) and industrial facilities, unless HASP/site rules provide exemption. It is the responsibility of all employees to report to any work site prepared to work in Level D PPE. All other protective equipment is the responsibility of the project.

5.1 Eye Protection

All employees engaged in or working in areas adjacent to eye-hazardous activities or operations shall wear appropriate eye protection.

- Safety glasses are required for impact protection, and shall meet ANSI Standard Z87.1 requirements.

- Chemical goggles are required for protection against chemical splash.

- Face shields are required for face protection from chemical splash and are not a substitute for eye protection.

- Full-face respirators can provide eye and face protection in lieu of safety glasses, goggles, or face shields.

5.1.1 Prescription Eye Protection. The company will provide prescription safety glasses (meeting ANSI Standard Z87.1) for field/shop/lab personnel, and computer glasses for computer users, as required by their individual vision status and job. Glasses will be provided every two years unless damaged on-the-job, or the employee exhibits a significant change of prescription.

Lenses shall be clear polycarbonate or plastic. Special tints or dark lenses can be obtained for special applications (e.g., extended outdoor work) with prior written approval from the Health & Safety Department.

Employees requiring corrective lenses inside of respirator face-pieces will be provided with safety lenses and frames sized for respirators and the respirator insert, in addition to conventional prescription safety glasses.

Employees will arrange and pay for the eye examination through the company-provided vision care program. The company will pay for fitting services and the safety glasses.

The company has established a national contract with a protective eyewear provider. Employees should contact the local HS representative (with current lens prescription), who will coordinate with the local purchasing representative to order eyewear. Employees choosing to use another provider will be reimbursed up to $65 for safety or computer glasses, after the Health & Safety Department has verified that the glasses meet the ANSI Standard requirements.

5.2 Foot Protection

Basic foot protection is required for all job sites and industrial locations. Specialized footwear shall be provided as required by the nature of the work. Special foot protection may include, but is not limited to, chemically resistant, thermally shielded, metatarsal guards, etc.

5.2.1 Leather Safety Shoes. Safety shoes may be used in place of chemical resistant footwear when an employee will be working in a clean or uncontaminated work areas. Generally, when the employee desires to use safety footwear other than standard chemical resistant footwear provided, the company considers it the responsibility of the employee to provide such footwear and ensure that it meets ANSI Standard Z41. Company supervision will enforce the use of appropriate protective footwear per the requirements of the site-specific Health and Safety Plan. Where state or local regulations require (i.e., California and Connecticut), the company will provide all necessary safety equipment.

Employees can purchase safety shoes through national purchasing agreements established by the company. Under the limited circumstances where the company will provide safety shoes, such purchases must be approved by the project or appropriate department/local manager. After the Health & Safety Department has verified that the safety shoes meet ANSI requirements, the employee will be reimbursed for the actual purchase price of the shoes up to a maximum of $90.00.

Athletic-style safety shoes ("safety sneakers") are prohibited for all field operations due to the difficulties created by these styles in supervising proper use of protective footwear. Employees in fixed laboratory operations may wear athletic-style safety shoes with the prior approval of the Lab Director or HS Coordinator.

5.3 Head Protection

Hard hats meeting ANSI Z89.1 shall be provided to protect employees from impact, penetration, falling objects, and/or limited electrical shock and burn, as appropriate for work site hazards.

5.4 Respiratory Protection

Respirators shall be provided, in accordance with Procedure HS601, Respiratory Protection Program.

5.5 Hearing Protection

Hearing protection shall be provided, in accordance with Procedure HS402, Hearing Conservation Program.

5.6 Body Protection

Protective clothing, gloves, boots, and other protective equipment shall be provided as appropriate for the hazards associated with the tasks being performed.

5.7 Providing Personal Protective Equipment to Non-Company Personnel

The following personal protective equipment may be provided to non-company personnel:

- Hard hats
- Chemical goggles
- Safety glasses (non-prescription)
- Face shields
- Chemical resistant boots
- Chemical resistant gloves
- Hearing protectors
- Disposable chemical resistant personal protective clothing

5.8 Management Duties

It is the responsibility of the Health & Safety Department to specify safety equipment requirements for each job.

It is the responsibility of project managers or location managers to provide adequate quantities of safety equipment required for their job(s) or project(s).

It is the responsibility of supervisors to verify that required safety equipment is properly used.

6.0 EXCEPTION PROVISIONS

Variances and exceptions shall be permitted pursuant to the provisions of Procedure HS013, "Health & Safety Procedure Variances".

7.0 CROSS REFERENCES

HS050 Training Requirements
HS402 Hearing Conservation Program
HS601 Respiratory Protection Program
ANSI Standard Z41, *Personal Protection - Protective Footwear*
ANSI Standard Z87.0, *Practice for Occupational and Educational Eye and Face Protection*
ANSI Standard Z89.1, *Protective Headwear for Industrial Workers*

8.0 ATTACHMENTS

1. Responsibility Matrix

ATTACHMENT 1
PERSONAL PROTECTIVE EQUIPMENT

Responsibility Matrix

Action	Procedure Section	*Responsible Party*			
		Vice President, HS	**Local HS Department**	**Project/ Location Managers**	**Supervisors**
Issue, revise, and maintain this procedure.	3.1	X			
Approve all personal protective equipment prior to use.	5.0		X		
Coordinate reimbursement to employee for PPE purchases.	5.1.1, 5.2.1		X		
Provide adequate quantities of safety equipment as required.	5.8			X	
Verify that required safety equipment is properly used.	5.8				X

PROCEDURE

Subject: RESPIRATORY PROTECTION PROGRAM

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to prescribe the requirements of the company Respiratory Protection Program (RPP). This procedure provides information and guidance on the proper selection, medical evaluation, training, use, and care of respiratory protective equipment and complies with the requirements of 29 CFR 1910.134 (1998).

All operations which require the use of respiratory protection are subject to the provisions of this procedure.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

Program responsibilities are detailed throughout this procedure. The Responsibility Matrix summarizes these items and can be found as Attachment 1.

4.0 DEFINITIONS

Action Level (AL) - Airborne contaminant concentration which is one-half of the Permissible Exposure Guideline (PEG).

Air Purifying Respirator (APR) - Negative pressure respirator (also referred to as a cartridge respirator) which filters contaminated air through chemical or mechanical filter elements. APRs include: cartridge, canister, gas masks, and single-use respirators (single-use respirators are not approved for use by the company).

Approved Respirator - Any respirator, identified by manufacturer and model, that has been approved by NIOSH 42 CFR Part 84 and has been incorporated into the List of Approved Respiratory Protective Equipment (Attachment 2).

Assigned Protection Factor (APF) - A term that is reserved in the OSHA Standard 1910.134 (January, 1998). Attachment 3 provided PFs for the respiratory protective equipment based upon type of device and method of fit testing. The company will continue to use the PFs established by NIOSH until OSHA issues their definition of APF.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Contractor Personnel - A group of persons hired to perform a specific activity based on their expertise and ability to operate independent of direct supervision. Contractor personnel are supervised by their management group which reports to an employee of the company for project direction.

End-of-Service-Life Indicator (ESLI) - A system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Emergency - Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Exposure Limit - Several published airborne contaminant concentration values exist which are used in establishing acceptable personnel exposures to contaminants. OSHA publishes the Permissible Exposure Limit (PEL), NIOSH publishes the Recommended Exposure Limit (REL), and the ACGIH publishes the Threshold Limit Value (TLV). All of these exposure limits are based on an 8-hour work shift, 40-hour work week, and 40-year work life. The values may vary from contaminant to contaminant as well as between publishing bodies.

Field Office - Any office or satellite office performing field activities which may require the use of respiratory protection.

Filtering Facepiece (Dust Mask) - A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit Factor (FF) - This term means a quantitative estimate of the fit of a particular respirator to a specific individual and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. The FF incorporates a safety factor of 10 because protection factors in the workplace tend to be much lower than the fit factors achieved during fit testing. Acceptable fit factors are 100 for a tight-fitting half facepiece and 500 for a tight-fitting full facepiece respirators.

HASP - Health and Safety Plan.

Health and Safety Representative - A member of the company Health and Safety Functional Resource Group who, through credentials, training, or experience, has the necessary qualifications and authority to specify respiratory protection and evaluate respiratory protection program elements.

Immediately Dangerous to Life or Health (IDLH) - An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Labor Pool Personnel - Temporary personnel hired for a given expertise or ability. Labor pool personnel report directly to an employee of the company.
Nuisance Level - Level of airborne contaminants which is below one-half the action level for that contaminant and presents no other health or safety hazard.

Permissible Exposure Guideline (PEG) - This term designates a specific exposure limit and is based on the best available information. The PEG will be the lower (more protective) of the values for the PEL and TLV. However, the REL shall take precedence for Hazardous Waste Operations (subject to 29 CFR 1910.120 or 1926.65) if no PEL exists, or for contaminants where no PEL or TLV exists. If there is no PEL, TLV, or REL, a Health and Safety Representative shall determine an appropriate permissible exposure guideline.

Permissible Exposure Limit (PEL) - An occupational exposure index promulgated by OSHA which carries the force of law. This value represents the allowable concentration to which it is believed an employee may be exposed to 8 hours a day, 40 days a week, for a 40-year working life without experiencing adverse health effects.

Positive Pressure Respirator - A respirator in which the pressure inside the respirator exceeds the ambient air pressure outside the respirator.

Powered Air Purifying Respirator (PAPR) - A positive pressure APR which incorporates a fan an battery pack unit. The system pulls contaminated air through the filter elements before delivery to the facepiece under positive pressure. Air pressure in the mask must remain above ambient pressure.

Qualitative Fit Test - A procedure for assuring that the respirator provides adequate protection based on a pass/fail fit test that relies on the individual's response to the test agent. Standard fit test protocol will utilize the irritant smoke methods as described in Attachment 4.

Quantitative Fit Test - A fit test that provides an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory Protection Program Coordinator (RPP Coordinator) - A person designated by the Health and Safety Representative to administer and supervise the respiratory program at a local facility or project location. This person will have the necessary training or credentials to execute this task.

Recommended Exposure Limit (REL) - An occupational exposure index published by NIOSH which is a recommended guideline for employee protection. This value represents the allowable concentration to which it is believed an employee may be exposed to 10 hours a day, 40 hours a week, for a 40-year working life without experiencing health effects.

Supplied Air Respirator (SAR) - Positive pressure respirator which supplies an independent source of breathing air to the user. Two types of SARs are available: self-contained breathing apparatus (SCBA) and airline.

Threshold Limit Value (TLV) - An occupational exposure index published by ACGIH which is recognized as an industry guideline and represents the concentration to which it is believed that nearly all employees may be exposed to 8 hours a day, 40 hours a week without experiencing adverse health effects.

5.0 TEXT

The company will employ engineering controls (e.g., enclosure, ventilation, material substitution, etc.) as the primary method to limit employee exposure. However, for those situations where engineering and administrative controls are ineffective at controlling employee exposure, the use of respiratory protective equipment may be required.

This RPP provides specific requirements for selection, assignment, training, and medical evaluation for persons expected to wear respiratory protection.

5.1 Assignment of Equipment to Contractor/Labor Pool Personnel

Contractor personnel shall provide their own respiratory protective equipment and shall also confirm meeting all other requirements of their own RPP and that of the company's RPP (i.e., medical clearance, training, etc.).

The company may provide the following respiratory protective equipment to <u>Contractor Personnel</u>:

- Disposable equipment such as filter elements.
- Hardware for airline systems (up to, but <u>not</u> including, the airline and facepiece) which employees are sharing.

The company will <u>not</u> provide the following respiratory protective equipment to <u>Contractor Personnel</u>:

- APR or PAPR facepieces.
- SCBAs, SAR respirators, or airline.

The company may provide respiratory protective equipment to <u>Labor Pool Personnel</u> if the following have been established:

- The labor pool personnel have successfully completed training as required by 29 CFR 1910.134 and other applicable regulations.
- The labor pool personnel have been fit tested in relation to projected exposure levels and contaminants to be encountered.
- The labor pool personnel have been medically approved to wear respirators.
- All other RPP requirements have been met.

5.2 Approval, Selection, and Purchase of Respiratory Protective Equipment

The following requirements are designed to guide correct selection of respiratory protective equipment.

5.2.1 Approval. The Vice President, Health and Safety has approved respirators manufactured by Survivair as the primary respirators for use by employees. For employees who cannot achieve a satisfactory fit or comfort factor in Survivair respirator, Mine Safety Appliance (MSA) respirators will be selected. The list of approved model respirators is included in Attachment 2. Contractor personnel may select any respiratory protective equipment that has received approval from NIOSH.

5.2.2 Selection. The Health and Safety Representative shall base the selection of respiratory protective equipment upon an assessment of potential respiratory hazards that may be encountered. This assessment may utilize a variety of written information such as the NIOSH Pocket Guide to Chemical Hazards, Material Safety Data Sheets, analytical data, air monitoring results, or other applicable information. The selection process shall incorporate the following guidelines:

- Respiratory protection is to be selected by Health and Safety Representatives only. Full facepiece respirators are the usual preference because of superior protection factor and the face/eye protection afforded. Half facepiece respirators can only be used in situations where less than one-half the PEG is expected. The type of respirator selected will be documented in the Project HASP.

- Selection of the appropriate respiratory protective equipment shall include factors such as the chemical state and physical form of the chemical contaminant, atmospheric concentration during routine and emergency events, potential physical hazards, expected job task requirements, and the performance of the respirator in providing the appropriate level of protection against these hazards.

- Consideration shall be given to the nature of the hazardous operation, location of the hazardous area relative to nonhazardous breathing air supply, duration of wear, activities to be performed, and characteristics and function of the respiratory protective equipment to be worn.

- Selected respirators (i.e., Survivair or MSA) shall be NIOSH certified and used in compliance with the conditions of its certification when employees are exposed to toxic materials or other hazardous atmospheres.

- Respirators must provide adequate face and eye protection for the expected task.

- If an APR or PAPR is used, the respirator shall be equipped with an end-of-service life-indicator (ESLI) certified by NIOSH for the contaminant. If an ESLI is not available for the contaminant, a cartridge element change schedule shall be implemented which is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. This information will be described in the HASP.

- The PF for the respirator selected (Attachment 3) shall be used according to the following relationship with the PEG to establish justification for selection:

PF x PEG > Maximum anticipated contaminant concentration

If this equation is false, a respirator with a greater PF must be selected. Also review Attachment 3 to determine the required fit testing for the expected maximum anticipated contaminant concentration. The Health and Safety Representative may determine that a more conservative approach (e.g., 50 percent PF) may be needed. Decision to do so should be documented in the Project HASP.

- Manufacturer-established limitations of the APR filter elements relative to the contaminants of concern shall be used to establish further justification for the selected respirator should the APR’s FF not disqualify its use (e.g., maximum anticipated contaminant concentration).

5.2.3 Purchase. The purchase request of respiratory protective equipment (including cartridges, airlines, compressed air) should be reviewed by a Health and Safety Representative to indicate that the ordered material meets established requirements. **Under no circumstances may anyone (purchasing, warehouse, project manager, etc.) purchase or provide other than the specific respiratory protection equipment selected by the Health and Safety Representative.**

5.3 Medical Evaluation

No employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator. The medical evaluation must be conducted prior to fit testing and work requiring the use of respiratory equipment.

The medical evaluation shall be performed by a physician typically in conjunction with a physical examination meeting the requirements of 29 CFR 1910.120 (f) *Medical Surveillance*. The physician will be informed of the type of work expected of the employee, the types of respiratory protection and personal protective equipment required, and other information indicating the expected stresses of the task. The company medical director shall be given a copy of the company RPP and a copy of 1910.134 (e) *Medical Evaluation*.

The company medical director shall provide a written recommendation regarding the employee’s ability to use respiratory protection. The company shall ensure that the company medical director supplies the employee with a copy of this recommendation.

Additional medical evaluations will be provided to the employee if:

- Any medical signs or symptoms due to respirator use are reported by the employee, supervisory, or health and safety personnel.

- A change in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

5.4 General Program Requirements

5.4.1 Responsibilities. The following information describes the responsibilities for the selection, use, and maintenance of respiratory protective equipment based upon job function:

Management

- Management shall take necessary and cost-effective measures to reduce, where possible, the need for respiratory protective equipment (e.g., enclosed cabs on heavy equipment to reduce airborne dust, operations performed upwind, etc.)

- Respiratory protective equipment shall be provided by management whenever it is determined that such equipment is necessary to protect the health of the employee or when requested by an employee and approved by the Health and Safety Representative.

- Management shall assign work tasks requiring the use of respiratory protective equipment to only those employees who are medically qualified to wear respiratory protective equipment.

- Management shall ensure that employees are trained in the use of respiratory protection prior to being assigned to an activity that requires its use.

- Management shall provide the means for the maintenance of respiratory protection as required.

Health and Safety Representative

- Health and Safety Representatives shall determine appropriate respiratory protection for each job. The decision logic for this selection shall be documented in the Project HASP.

- Health and Safety Representatives shall monitor compliance with the various aspects of this program, provide technical assistance regarding respirator selection and use, evaluate the effectiveness of the RPP, and support respirator training and fit testing at locations under their control.

- Health and Safety Representatives shall conduct regular audits to determine compliance with this procedure. This audit can include a review of maintenance, training, medical and air monitoring records, and review the status of this procedure with regard to current regulatory requirements.

- Health and Safety Representatives shall maintain or oversee maintenance of all other records required by this RPP and shall provide for the training and fit testing of personnel assigned respiratory protective equipment.

- Health and Safety Representatives shall appoint a RPP Coordinator for each location which uses or may have a need to use respiratory protection. The Health and Safety Representative must assure the RPP Coordinator has the necessary training to fulfill his/her responsibilities.

RPP Coordinator

- The RPP Coordinator shall be responsible for cleaning, maintenance, and storage of all respirators not routinely used or not individually assigned.

- The RPP Coordinator shall maintain respirator supplies, including spare parts; submit purchase requests for new equipment; and assure that sufficient quantities of cartridges are available for each field office/project.

- The RPP Coordinator shall assure that air supply and emergency respiratory protection is properly inspected and maintained.

- Respirators shall be repaired by either qualified personnel under the direction of the RPP Coordinator, or by contracted supplier.

- The RPP Coordinator shall maintain models and sizes of respirators available for selection and fitting.

- The RPP Coordinator shall conduct fit testing.

Training Department

- Records pertaining to training and fit testing will be maintained by the Training Department.

Employee

- The employee shall use the provided respiratory protective equipment when instructed to do so in accordance with training received.

- The employee shall clean, disinfect, and properly store the assigned respirator, unless other arrangements are made on a project level.

- The employee shall guard against damage to the assigned respirator.

- The employee shall inspect the respirator before each use and after cleaning.

- The employee shall report any malfunction of the respirator immediately to their supervisor and/or the RPP Coordinator.

- The employee shall report to their supervisor any change in their medical status that may impact their ability to wear a respirator safely.

5.4.2 **Use of Corrective Lens Eyewear.** In general, contact lenses are permitted to be worn when respiratory protection is used. Although in certain instances, client- or project-specific rules may not allow for their use.

If an employee chooses not to wear contact lenses, management shall assure that the appropriate frames or ophthalmic device attachments are obtained and provided at no cost to the employee.

5.4.3 **Obstruction of Face Seal.** Employees who wear respirators are required to be clean shaven to the extent that there is no obstruction between the wearer's skin and the facepiece. Trimmed mustaches and facial hair which does not interfere with the seal are allowable.

In addition, respirators shall not be worn when conditions prevent a good face-to-facepiece seal such as corrective lenses or goggles, or other personal protective equipment.

5.5 Instruction, Training, and Fit Test

5.5.1 **Instruction and Training.** The Training Department shall provide a standard respiratory protective equipment training program for use by qualified personnel such as the Health and Safety Representative or RPP Coordinator. The Training Department will support training at the project location if the project does not have the qualified personnel and/or the equipment to support its own program. As an alternative, the project location may use a respiratory manufacturer's training program if the program meets company requirements, a competent person conducts the training, adequate equipment is available for demonstration, and fit testing is conducted along guidelines established in this procedure. The Training Department must approve all alternative training methods.

The basic respirator training program shall include, as a minimum, the following:

- Training and annual retraining of employees in the selection, use, maintenance, and limitation of each respirator type used.

- Instruction on the nature of the respiratory hazards and potential health effects resulting from exposure.

- Opportunity for "hands on" experience with the respiratory protective equipment.

- Proper fitting, including demonstrations and practice in wearing, adjusting, and determining the fit of the respirator. A selection of respirators shall be available to determine the most comfortable respirator and the best fit.

- Instruction on how to test the face-to-facepiece seal.

- A familiarization period of wear in ambient air.

- For APRs, wearing the respirator in a test atmosphere (typically irritant smoke) for qualitative fit testing. The qualitative fit test shall follow the guidelines outlined in Section 5.5.2.

- Training to recognize and cope with emergency situations (including respirator failure)

- Training and fit testing shall be repeated annually, unless specific OSHA regulations require a more frequent time period (e.g., asbestos, lead operations). Each person receiving training shall complete the Respirator Fit Test Form (Attachment 5).

- Training records will be maintained by the Training Department and the location Health and Safety Representative. On-site records of training and fit testing will be maintained as required by specific regulation (e.g., asbestos work) (refer to Section 5.8).

- It is the responsibility of the RPP Coordinator to verify that all project personnel meet the requirements of this RPP.

5.5.2 **Fit Testing.** Prior to the use of any negative or positive pressure tight-fitting facepiece, the employee must be fit tested.

- All employees assigned to operations requiring the use of respiratory protective equipment shall have been fit tested within 12 months, or as required by specific regulations (e.g., asbestos, lead operations). Fit test and qualification cards (or a copy of the completed Attachment 5) must be available during operations.

- The employee shall be fit tested with the same size and model as they are expected to wear.

- Qualitative fit test (QLFT) shall be used when a protection factor of 10 or less is required for a negative pressure respirator.

- Quantitative fit test (QNFT) shall be used when a protection factor of greater than 10 is required for a negative pressure respirator. When executing the QNFT, the acceptable test result is 100 for tight fitting half-facepiece respirators and 500 for full-facepiece respirators.

- Fit testing for tight-fitting atmosphere supplying respirators and tight-fitting APRs shall be in a negative pressure mode regardless of the mode of operation that is used for respiratory protection.

- Assessment of comfort shall be made after allowing adequate time for this evaluation. This evaluation shall include reviewing the following points with the employee: positioning of the mask on nose, room for eye protection if required, room to talk, and positioning of the mask on the face and cheeks.

- The following criteria shall be used to help determine the adequacy of the respirator fit: chin properly placed, strap tension, fit across the nose bridge, and tendency to slip.

- If physical obstruction (e.g., facial hair, eyeglasses) interferes with the face-to-facepiece seal, then it shall be altered or removed so as to eliminate any interference and allow for a satisfactory fit. If the employee refuses to alter the physical obstruction, then they shall be denied a satisfactory fit report and referred to his/her supervisor for consideration.

- The fit test protocol (Attachment 4) shall be followed. The Health and Safety Representative and Training Department shall determine which fit test protocol shall be followed depending upon the situation.

5.6 Maintenance Program

Each RPP Coordinator is responsible for verifying the respirator maintenance program is implemented in an effective manner for the facility or project site, the working conditions, and the potential hazards involved. As a minimum, the following aspects must be implemented:

- Inspection
- Cleaning and sanitizing
- Repair
- Respirator storage
- Inspection and repair documentation, as required
- Compliance with manufacturer recommendations.

Detailed information regarding cleaning, inspection, maintenance, and storage is found in Attachment 7. The RPP Coordinator shall verify compliance with the maintenance program by periodic inspections and field audits.

5.6.1 Inspection

- All respiratory protective equipment systems shall be inspected by the wearer for defects and/or deterioration immediately prior to and after each use.

- Any defects shall be reported to their supervisor immediately and the respirator removed from use until it can be repaired or replaced.

- Respiratory protective equipment systems not used routinely (including all SCBAs and equipment designated only for emergency use) shall be inspected before and after each use and at least every 30 days. Cylinders shall be recharged whenever the pressure falls below 90 percent of the manufacturer's recommended pressure level. This inspection shall be documented by some method on the unit (i.e., tag). Records of inspections shall be kept through appropriate documentation. Attachment 6 provides an example of inspection documentation for SCBAs. At a minimum, these records will include: date, inspector, and any unusual finding or condition. Any repairs or modifications shall be documented in detail.

- General field inspection shall include a check of the following: tightness of all connections, facepiece, valves, and any connecting tubes or filtering elements.

- Employees who are manufacturer-qualified repair technicians shall be used for all maintenance beyond field inspections, tests, and user-performed cleaning.

- Air supplied respiratory systems shall be inspected by a manufacturer's authorized representative at the manufacturer's recommended schedule. Manufacturers typically require an annual flow test and a complete overhaul every 5 to 7 years.

- **Specific inspection procedures are outlined in Attachment 7.**

5.6.2 Cleaning and Sanitizing. Employees maintaining their own respirators shall be thoroughly briefed on how to clean and disinfect them. On projects where employees clean their own respirator, the generally accepted procedure involves washing with detergent and warm water using a soft brush, submersion in sanitizing agent, thoroughly rinsing in clean water, drying in a clean place, and storage in sealed plastic bags or equivalent. Precautions to be taken to prevent damage from rough handling during this procedure are detailed in Attachment 7.

At locations where employees share respirators, a centralized cleaning and maintenance facility with specialized equipment and/or materials and personnel trained in respirator maintenance must be established. Cleaning and inspection is primarily the responsibility of the user.

5.6.3 Repair. The company will only use respiratory protective equipment that is physically sound.

- If defects are found during any inspection, two remedies are possible. If parts and trained personnel are available, repair and/or adjustment may be made immediately. If parts or trained repair people are unavailable, the device shall be removed from service until it can be repaired. Under no circumstances shall a device that is known to be defective remain in service.

- Replacement or repair shall be done by adequately trained personnel. For negative pressure respirators, the Health and Safety Representative or RPP Coordinator may train or supervise personnel in the replacement of items such as inhalation/exhalation valves, head harness, cartridge adapters, and lenses. For air-supplied respirators, field repairs are limited to replacement of head harness and lenses. All other work must be completed by a factory-certified repair person.

Repair shall only be made with parts designed for the respirator. Substitution of parts from a different brand or type invalidates the respirator's approval and is prohibited.

5.6.4 Storage. Respirators must be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and mechanical damage.

- Respirators shall be stored in such a manner that the facepiece, exhalation valve, and straps are not distorted.

- Respirators shall be stored in sealable containers (e.g., ziplock bags) after cleaning and disinfecting.

- The storage location of emergency respiratory protection shall be readily accessible and prominently identified.

- Respirators shall be stored in an area free of contamination.

5.7 Field Use

The following guidelines for the use of respirators (or equivalent) shall be incorporated into the Project HASP as appropriate. Additional guidelines may be required based on working conditions and hazards involved. Each location where respiratory protective equipment is required or worn shall include in the Project HASP justification for the selected respiratory protective equipment systems worn as outlined in Section 5.2 of this procedure.

5.7.1 General Requirements. The following general requirements shall be followed whenever respiratory protection is used:

- Employees shall be allowed to leave the regulated area to readjust the facepiece or to wash their faces and to wipe clean the facepieces of their respirators in order to minimize potential skin irritation associated with respirator use.

- Respiratory protective equipment shall not be passed on from one person to another until it has been cleaned and sanitized, per program requirements.

- Respirators will be inspected, and a positive/negative pressure test performed prior to each use.

- Entry into oxygen-deficient (< 19.5 percent O_2) atmospheres, Immediately Dangerous to Life and Health (IDLH) atmospheres, or areas requiring EPA Level A protection is prohibited without the prior approval of the Vice President, Health and Safety or the CIH assigned to the business line.

- Head coverings such as Tyvek hoods shall not be allowed to pass between the face-to-facepiece seal.

- The harness straps of tight-fitting respirators shall not be positioned or worn over hard hats.

5.7.2 Specific Requirements. The following information details specific requirements by respirator class:

Air Purifying Systems

- When APRs are worn, new filter elements shall be installed at the beginning of operations. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if "breakthrough" is perceived or whenever an increase in breathing resistance is detected. In most cases, the cartridges will be replaced a minimum of once daily, usually at the end of the work shift.

Powered Air Purifying Systems

- When PAPRs are worn, employees shall change filter elements after each day's activities. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if "break-through" is perceived or when airflow through filter elements decreases to an unacceptable level as indicated by the manufacturer's test device.

Compressed Air

- Compressed air used for breathing shall meet at least the requirements of the specification for Grade D breathing air or better (D, E, or G; not A, K, or L) as described in the American National Standard Commodity Specification for Air, ANSI/CGA G-7.1-1989. Further information is provided in Attachment 7, Guide to Respiratory Protective Equipment Cleaning, Inspection, Maintenance, and Storage.

- Breathing air suppliers must provide certification of analysis stating conformance, as a minimum, to Grade D breathing air standards as previously referenced for each cylinder and/or air lot.

- Air delivered in bulk, e.g., tube trailers, shall have each tube or unit, or a representative number of tubes or units verified as to oxygen content prior to using that tube.

- Pure oxygen shall NOT be used at any time in open-circuit SCBAs or airline respirators.

- Breathing air cylinders shall be legibly identified with the word "AIR" by means of stenciling, stamping, or labeling as near to the valve end as practical.

- Breathing air cylinders may be stored on their sides provided the valve caps are in place.

Supplied Air Breathing Systems

- Airline couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of airline respirators with nonrespirable gases or oxygen.

- Standard airline couplings for breathing air systems are Foster quick connect fittings with locking dots. Hansen quick connect fitting may also be used, but must not be used where they can be inadvertently actuated and disconnected. For example, Hansen fittings could be used at the regulator connection, but not on the airline unless protected from disconnection by some other means.

- The hose line length shall not exceed 300 feet from the air bank regulator to the user.

- No more than three connections, excluding the connection to the regulator and final connection to the respirator, shall be between the breathing air cylinders and the user.

- Breathing air hose shall be protected from direct contact with chemical materials which may permeate the hose. Acceptable methods of protection include suspension of the hose from the surface or covering with a commercially available sleeve or visqueen. Breathing air hose which has become contaminated will be removed from service and disposed of properly.

- The breathing air regulator shall be adjusted to provide air pressure as per the manufacturer's recommendations. For Survivair units, this pressure shall be between 80 to 125 psi pressure.

- Cascade systems shall be equipped with low pressure warning alarms or similar warning devices to indicate air pressure in the manifold below 500 psi.

- When a cascade system is used to supply breathing air, a worker outside the Exclusion Zone shall be assigned as safety standby within audible range of the low pressure alarm.

- When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3,000 psi. The supply hose and coupling shall be relatively short ($\leq$ 3 feet) and secured to prevent whipping when pressurized.

- Large supplied air cylinders shall be stored and handled to prevent damage to the cylinder or valve. Cylinders shall be stored upright with the protective valve cover in place and in such a way (e.g., supported with substantial rope or chain in the upper one-third of the cylinder, or in racks designed for the purpose) as to prevent the cylinder from falling. Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125 degrees F. Cylinders with visible external damage, evidence of corrosion, or exposure to fire shall not be accepted or used.

- Only cylinders within current hydrostatic test periods shall be used. For fiber wrapped bottles designated by the DOT-E label, hydrostatic testing shall be completed every 3 years. Maximum service life for these cylinders is 15 years. Steel or aluminum cylinders shall be hydrostatically tested every 5 years. No maximum service life is established for steel or aluminum cylinders.

- SCBAs shall only be used in the positive pressure mode when in the Exclusion Zone.

- Standby SCBA equipment must be present when air supply systems are used in IDLH or potentially IDLH atmospheres.

Escape/Egress Units

- These respirators are intended for use in areas where escape with a short-term (5 minute) air supply is necessary. They may be used as adjuncts to airline respirators as a backup air supply, or as independent emergency devices in areas where respiratory protective equipment is not normally required.

- Appropriate training shall be accomplished and documented prior to assigning employees to tasks or locations subject to the use of these respirators.

- Escape/egress units (5-minute air supply) shall never be used as primary standby respirators for confined space entry.

- Escape/egress units shall never be used to enter, or continue working in, a hazardous atmosphere.

5.7.3 IDLH Atmospheres. For all IDLH atmospheres, the company shall ensure that:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere.

- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.

- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.

- The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation.

- Employee(s) located outside the IDLH atmosphere are equipped with:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied air respirator with escape/egress unit.

- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry. Equivalent means of rescue can be considered.

5.8 Recordkeeping

The following documents must be part of the site recordkeeping program:

- Employees' medical clearances for respirator use
- Respirator training and fit testing forms.

5.9 Program Evaluation

This RPP shall be reviewed annually at the direction of the Vice President, Health and Safety.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

Title 29, Code of Federal Regulations, Section 1910.134.

AIHA, ***Respiratory Protection, A Manual and Guideline***, 1980.

American National Standards Institute Practices for Respiratory Protection Z88.2-1992 (or most recent publication)

NIOSH, ***Certified Equipment List*** (most recent version)

Company Health and Safety Procedures:

HS013 Health and Safety Procedure Variances
HS040 Stop Work Authority
HS050 Training Requirement
HS052 Health and Safety Plans
HS102 Management of Employee Exposure and Medical Records
HS104 Employee Notification of Industrial Hygiene Monitoring Records
HS300 Confined Spaces
HS304 Compressed Gas Cylinders
HS600 Personal Protective Equipment

8.0 ATTACHMENTS

1. Responsibility Matrix
2. List of Approved Respiratory Protective Equipment
3. Respirator Type, Protection Factor, and Fit Testing Method
4. Mandatory Respirator Fit Test Protocol
5. Respirator Fit Test Form
6. Emergency Respiratory Protective Equipment Monthly Inspection Checklist
7. Guide to Respiratory Protective Equipment Cleaning, Inspection, Maintenance, and Storage

ATTACHMENT 1
RESPIRATORY PROTECTION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party* Employee	Health and Safety Representative	Project/ Location Management	VP, Health and Safety	Training	RPP Coordinator
Issue, Revise, and Maintain Procedure	3.1				X		
Assure Proper Selection of Respirators	5.2.2		X				
Review Purchase Requests for Respiratory Equipment	5.2.3		X				
Conduct Fit Testing	5.4		X				X
Assure Compliance with RPP	5.4		X	X			X
Assure Training	5.4		X	X			X
Audit Program Compliance	5.4		X		X		X
Assist/Approve Local Training Program	5.4					X	
Maintenance Program	5.6	X	X	X			X
Field Use	5.7	X	X	X			X
Recordkeeping	5.8	X	X			X	X
Program Evaluation	5.9				X		

ATTACHMENT 2

LIST OF APPROVED RESPIRATORY PROTECTIVE EQUIPMENT

AIR PURIFYING RESPIRATORS (APR)

Respirator Class	Respirator Type	Respiratory Performance	Manufacturer	Model Name	Model Number
Standard APR	Half-Face	Negative Pressure	Survivair	Blue 1	2100-10 S 2200-10 M 2300-10 L
Standard APR	Half-Face	Negative Pressure	MSA	Comfo II	479529 S 479428 M 479530 L
Standard APR	Full-Face	Negative Pressure	Survivair	20/20	202062 S 202072 M 202082 L
Standard APR	Full-Face	Negative Pressure	MSA	Ultra Twin	480263 S 480259 M 480267 L
Powered APR	Hood	Continuous Positive Pressure	Survivair	PAPR	5200-15
Powered APR	Hood	Continuous Positive Pressure	MSA	Optimair 6	480251 S 480247 M 480255 L

SUPPLIED AIR RESPIRATORS (SAR)

Respirator Class	Respirator Type	Respiratory Performance	Manufacturer	Model Name	Model Number
Airline SAR	Full-Face	Positive Pressure Demand	Survivair	Panther	P968455
Airline SAR	Full-Face	Positive Pressure Demand	MSA	Premaire	497291
SCBA SAR	Full-Face	Positive Pressure Demand	Survivair	Cougar	P 9643310
SCBA SAR	Full-Face	Positive Pressure Demand	MSA	MMR WorkMask 2216	Varies on Components
Emergency	Escape/Egress Unit	Continuous Flow	Survivair	5 min. EEGA	9750870
Emergency	Escape/Egress Unit	Continuous Flow	MSA	Custom Air V	484353

ATTACHMENT 3

RESPIRATOR TYPE, PROTECTION FACTOR, AND FIT TESTING METHOD

Respirator Type	Protection Factor	QLFT	QNFT
Half-Face, Negative Pressure (<100 Fit Factor)[1]	10	Yes	Yes
Full-Face, Negative Pressure (<100 Fit Factor) Used in Atmosphere up to 10 Times the PEG	10	Yes	Yes
Full-Face, Negative Pressure (>100 Fit Factor) Used in Atmospheres Over 10 Times the PEG[2]	50	No	Yes
PAPR	100	Yes	Yes
SCBA/SAR Used in Positive Pressure (Pressure Demand Mode)	10,000	Yes	Yes

Footnotes:

1. If quantitatively fit tested, the device must demonstrate a fit factor of at least 100.
2. If quantitatively fit tested, the device must demonstrate a fit factor of at least 500.

ATTACHMENT 4

MANDATORY RESPIRATOR FIT TEST PROTOCOL

OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures - General Requirements

The company shall conduct fit testing using the following procedures. The requirements in this attachment apply to all OSHA-accepted fit test methods, both QLFT and QNFT. There are several OSHA-accepted fit test protocols for QLFT. This procedure includes only the irritant smoke protocol since it requires less equipment and is more practical for field use.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following Item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
   a. Position of the mask on the nose;
   b. Room for eye protection;
   c. Room to talk; and
   d. Position of mask on face and cheeks.

7. The following criteria shall be used to help determine the adequacy of the respirator fit:
   a. Chin properly placed;
   b. Adequate strap tension, not overly tightened;
   c. Fit across nose bridge;
   d. Respirator of proper size to span distance from nose to chin;
   e. Tendency of respirator to slip; and
   f. Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache, or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, he/she shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing his/her duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. *Exercise Regimen*: Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. *Test Exercises*: The following test exercises are to be performed for all fit testing methods prescribed in this attachment, except for the controlled negative pressure (CNP) method. A separate fit testing exercise regimen is contained in the CNP protocol.

    Each test exercise shall be performed for one minute, except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

    The test subject shall perform exercises, in the test environment, in the following manner:

    a. *Normal Breathing*: In a normal standing position, without talking, the subject shall breathe normally.

    b. *Deep Breathing*: In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

    c. *Turning Head Side to Side*: Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

d. *Moving Head Up and Down*: Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

e. *Talking*: The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can count backward from 100, recite a memorized poem or song or read from a prepared text such as the Rainbow Passage.

> Rainbow Passage:
>
> When the 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 reach, his friends say he is looking for the pot of gold at the end of the rainbow.

f. *Grimace*: The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

g. *Bending Over*: The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

h. *Normal Breathing*: Same as Item A.14.a.

B. Qualitative Fit Test (QLFT) Protocols

1. General:

a. The employer shall ensure that persons administering QLFT are able to perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

b. The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Irritant Smoke (Stannic Chloride) Protocol: This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

a. General Requirements and Precautions:

1. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

2. Only stannic chloride smoke tubes shall be used for this protocol.

3. No form of test enclosure or hood for the test subject shall be used.

4. The smoke take precautions to minimize the test subject�s exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

5. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the buildup of irritant smoke in the general atmosphere.

b. Sensitivity Screening Check: The person to be tested must demonstrate his/her ability to detect a weak concentration of the irritant smoke.

1. The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

2. The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

3. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject�s direction to determine that he/she can detect it.

c. Irritant Smoke Fit Test Procedure:

1. The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

2. The test subject shall be instructed to keep his/her eyes closed.

3. The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.

4. If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

5. The exercises identified in Item A.14 of this attachment shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

6. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

7. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

8. If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: quantitative fit testing using a nonhazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General:

   a. The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.

   b. The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol: The ambient aerosol CNC quantitative fit testing (Portacount®) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

   a. Portacount® Fit Test Requirements:

      1. Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 Series 100, Series 99, or Series 95 particulate filter) per manufacturer's instruction.

      2. Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the

wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

3. Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; and self-observation in a mirror to evaluate fit and respirator position.

4. Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

5. Follow the manufacturer's instructions for operating the Portacount® and proceed with the test.

6. The test subject shall be instructed to perform the exercises in Item A.14 of this attachment.

7. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

b. Portacount® Test Instrument:

1. The Portacount® will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

2. Since the pass or fail criterion of the Portacount® is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this attachment.

3. A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

3. Controlled Negative Pressure (CNP) Quantitative Fit Testing Protocol - The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer, Dynatech Nevada, also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his/her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity

of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

a. CNP Fit Test Requirements:

1. The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

2. The CNP system defaults selected for test pressure shall be set at 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

   (Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

3. The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

4. The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

5. The test subject shall be trained to hold his/her breath for at least 20 seconds.

6. The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

7. The QNFT protocol shall be followed according to Item C.1 of this attachment with an exception for the CNP test exercises.

b. CNP Test Exercises:

1. Normal Breathing: In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his/her breath for 10 seconds during the test measurement.

2. Deep Breathing: In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during test measurement.

3. Turning Head Side to Side: Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the

turning head side to side exercise, the subject needs to hold head full left and hold his/her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his/her breath for 10 seconds during test measurement.

4. Moving Head Up and Down: Standing in place, the subject shall slowly move his/her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his/her head full up and hold his/her breath for 10 seconds during test measurement. Next, the subject shall hold his/her head full down and hold his/her breath for 10 seconds during test measurement.

5. Talking: The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement.

6. Grimace: The test subject shall grimace by smiling or frowning for 15 seconds.

7. Bending Over: The test subject shall bend at the waist as if he/she were to touch his/her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement.

8. Normal Breathing: The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

c. CNP Test Instrument:

1. The test instrument shall have an effective audio warning device when the test subject fails to hold his/her breath during the test. The test shall be terminated whenever the test subject failed to hold his/her breath. The test subject may be refitted and retested.

2. A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject�s name; overall fit factor; make, model, style, and size of respirator used; and date tested.

ATTACHMENT 5
RESPIRATOR FIT TEST FORM

NAME (Please Print): ____________________________ SIGNATURE: ___________________________

SSN: _________-_______-_________ HOME DEPT: ____________________ DATE: _____________

CONDUCTED BY: _____________________________ LOCATION: ____________________________

FIT TEST PROTOCOL	**TYPE OF RESPIRATOR** (Circle Appropriate One)
QUANTITATIVE: Fit Factor _____________________________	APR/HF APR/FF SCBA SAR/EGS PAPR OTHER
QUALITATIVE: Irritant Smoke: Other (specify):	Respirator Manufacturer: __________________ Model: _________________________________ Size: ___________________________________

INITIAL:

1. I understand why respiratory protection is needed and where and when it should be used. ☐
2. I know how to use this respirator properly. ☐
3. I know how to clean and inspect this respirator. ☐
4. I understand the limitations and restrictions of this respirator. ☐
5. I wore this respirator in normal air and performed the user seal. ☐
6. I wore this respirator equipment in a test atmosphere. ☐
7. I understand that a good gas-tight face seal cannot be achieved with obstructions such as facial hair or glasses. ☐
8. I understand that corrective lenses compatible with the full facepiece are available by my manager. ☐

ATTACHMENT 6

EMERGENCY RESPIRATORY PROTECTIVE EQUIPMENT MONTHLY INSPECTION CHECKLIST

INSPECTED BY (Print):____ DATE:

BACKPACK#: ____ AIR CYLINDER#:

			PASS	FAIL
A. Backpack and Harness Assembly	1. Straps	Inspect for complete set	☐	☐
		Inspect for damaged straps	☐	☐
	2. Buckles	Inspect for mating ends	☐	☐
		Check locking function	☐	☐
	3. Backplage and Cylinder Lock	Inspect backplage for cracks, missing screws/rivets	☐	☐
		Inspect cylinder hold down strap	☐	☐
		Inspect strap tightener	☐	☐
B. Cylinder and Cylinder Valve Assembly	1. Cylinder	Cylinder tight to backplate	☐	☐
		Current Hydrostatic Test	☐	☐
		Inspect cylinder for dents, gouges	☐	☐
		Is cylinder at least 90% filled?	☐	☐
	2. Head and Valve Assembly	Inspect cylinder valve lock for presence	☐	☐
		Inspect cylinder gauge for condition	☐	☐
		Proper function of cylinder valve lock	☐	☐
		Test for cylinder leakage	☐	☐
C. Regulator and High Pressure Hose	1. High Pressure Hose and Connector	Leakage in hose	☐	☐
		Leakage in hose to cylinder connector	☐	☐
	2. Regulator and Low Pressure Alarm	Read regulator gauge (at least 1,000 psi)	☐	☐
		Low pressure alarm sounds at 500 psi	☐	☐
		Test integrity of diaphragm	☐	☐
		Test for positive pressure	☐	☐
		Test bypass system	☐	☐
D. Facepiece and Corrugated Breathing Tube	1. Facepiece	Inspect harness for deterioration	☐	☐
		Inspect facepiece body for deterioration	☐	☐
		Inspect lens	☐	☐
		Inspect exhalation valve	☐	☐
	2. Breathing Tube and Connector	Inspect breathing tube for deterioration	☐	☐
		Inspect connector for threads and gasket	☐	☐
	3. Leak Test and Cleaning	Perform negative pressure test on facepiece/ breathing tube	☐	☐
		Clean and sanitize facepiece	☐	☐

Note: Any item marked "Fail" will place the equipment out of service until repaired or replaced.

ATTACHMENT 7

GUIDE TO RESPIRATORY PROTECTIVE EQUIPMENT: CLEANING, INSPECTION, MAINTENANCE, AND STORAGE

A program for the maintenance of respirators shall include the following:

- Cleaning and sanitizing
- Inspection for defects
- Maintenance and repair
- Storage
- Assurance of breathing air quality.

The following maintenance, inspection, and storage program is recommended.

1. Cleaning and Sanitizing

Respirators issued to an individual shall be cleaned and sanitized regularly. Each respirator shall be cleaned and sanitized before being worn by different individuals. Respirators intended for emergency use shall be cleaned and sanitized after being used. The following shall be completed in addition to the manufacturer's instruction for cleaning:

a. Remove, when necessary, the following components of respiratory inlet covering assemblies before cleaning and sanitizing:

   1. Filters, cartridges, canisters
   2. Speaking diaphragms
   3. Valve assemblies
   4. Any components recommended by the respirator manufacturer.

b. Wash respiratory inlet covering assemblies in warm (43 degrees C or 110 degrees F maximum temperature) cleaner sanitizer solution. A stiff bristle (not wire) brush may be used to facilitate removal of dirt or other foreign material.

c. Rinse the respirator inlet covering assemblies in clean, warm (43 degrees C or 110 degrees F maximum temperature) water.

d. Drain all water, and air dry the respiratory inlet covering assemblies.

e. Clean and sanitize all parts removed from the respiratory inlet covering assemblies as recommended by the manufacturers

f. If necessary to remove foreign material, hand wipe respiratory inlet covering assemblies, all parts, and all gasket- and valve-sealing surfaces with damp, lint-free cloth.

g. Inspect parts and replace any that are defective.

h. Reassemble parts on respirator inlet covering assemblies.

i. Visually inspect and, where possible, test parts and respirator assemblies for proper function.

j. Place assembled respirators in appropriate containers for storage.

Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of large numbers of respirators. Extreme care shall be taken to ensure against tumbling, agitation, or exposure to temperatures above those recommended by the manufacturer (normally 43 degrees C or 100 degrees F maximum), as these conditions are likely to result in damage to the respirators.

Ultrasonic cleaners, clothes washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying respirators.

Cleaner sanitizers that effectively clean the respirator and contain a bactericidal agent are commercially available. The bactericidal agent frequently used is a quaternary ammonium compound. Strong cleaning and sanitizing agents and many solvents can damage rubber or elastomeric respirator parts. These materials must be used with caution.

Alternatively, respirators may be washed in a detergent solution and then sanitized by immersion in a sanitizing solution. Some sanitizing solutions that have proven effective are: (a) a hypochlorite (bleach) solution (50 parts per million chlorine), 2-minute immersion; (b) an aqueous iodine solution (50 parts per million of iodine), 2-minute immersion; or (c) a quaternary ammonium solution (200 parts per million of quaternary ammonium compounds in water with less than 500 parts per million total hardness), 2-minute immersion.

Inflammation of the skin of the respirator user (dermatitis) may occur if the quaternary ammonium compounds are not completely rinsed from the respirator. The hypochlorite and iodine solutions are unstable and break down with time; they may cause deterioration of rubber or other elastomeric parts and may be corrosive to metallic parts. Immersion times should not be extended beyond the mentioned time periods, and the sanitizers shall be thoroughly rinsed from the respirator parts.

Respirators may become contaminated with toxic materials. If the contamination is light, normal cleaning procedures should provide satisfactory decontamination; otherwise, separate decontamination steps may be required before cleaning.

2. Inspection

The user shall inspect the respirator immediately prior to each use to ensure that it is in proper working condition. After cleaning and sanitizing, each respirator shall be inspected to determine if it is in proper working condition, if it needs replacement parts or repairs, or if it should be discarded. Each respirator stored for emergency or rescue use shall be inspected at least monthly.

Respirator inspection shall include a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies, hoses, filters, cartridges, canisters, end-of-service indicators, electrical components, and shelf-life date(s); and for the proper function of regulators, alarms, and other warning systems. Each rubber or other elastomeric part shall be inspected for pliability and signs of deterioration. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturer's instructions.

A record of inspection dates shall be kept for each respirator maintained for emergency or rescue use. Respirators that do not meet applicable inspection criteria shall be immediately removed from service (a temporary replacement assigned) and repaired or permanently replaced.

Inspection of hoop-wrapped air cylinders will follow the recommendations set forth in the Compressed Gas Association, Inc. publication CGA C-6.2-1988, "Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders," and will be examined for the following five types of damage:

- Abrasion is damage caused by wearing, grinding, or rubbing away by friction. Abrasions less than 0.005 inch (0.127 mm) deep are acceptable and should have no adverse effects on the safety of the cylinder. Abrasions with isolated groups of fibers exposed or flat spots with a depth greater than 0.005 inch (0.127 mm) but less than 0.0075 inch (0.191 mm) are acceptable if the damage is repaired. Cylinders abraded in excess of 0.0075 inch (0.191 mm) should be taken out of service until professionally inspected.

- Cuts are damage inflicted by a sharp object. Cuts or scratches less than 0.005 inch (0.127 mm) deep are acceptable regardless of length, number, or direction. For cuts greater than 0.005 inch (0.127 mm) deep and up to a depth of 0.015 inch (0.038 mm) with a maximum 1- or 2-inch (25.4 mm or 50.8 mm) length transverse to the fiber direction, the cylinder should be removed from service until repaired. Cylinders with cuts greater than 0.015 inch (0.038 mm) with a maximum greater than 2 inches (50.8 mm) length transverse to the fiber direction or with bare metal showing through must be condemned.

- Impact damage is caused by a cylinder striking or being struck by another object. Impact damage is considered slight if a frosted area is noted in the impact area. These cylinders may be returned to service. Impact damage is severe if evidence of fiber cutting, delamination, and possible structural damage is apparent. Cylinders sustaining severe impact damage should be evaluated using the guidelines for cuts and structural damage.

- Structural damage is damage which causes a visual change in original cylinder configuration. This change can include any evidence of bulges, a cocked end fitting, concave areas on the domes or on the cylinder section, or, if by visual inspection of the cylinder interior, there is evidence of damage involving deformation of the liner. Structurally damaged cylinders must be immediately removed from service and condemned.

- Heat or fire damage to a cylinder is evident by discoloration, charring, or burning of the composite, labels, paint, or plastic components of the valve. Such damage would cause a cylinder to be removed from service and condemned. Note: If the cylinder is only soiled from smoke or other debris and is found to be intact underneath, it may be returned to service.

3. Maintenance and Repair

Replacement of parts or repairs shall be done only be persons trained in proper respirator maintenance and assembly. Replacement parts shall be only those designated for the specific respirator repaired. Reducing or admission valves, regulators, and alarms shall be adjusted or repaired by the respirator manufacturer or a technician trained by the manufacturer. Instrumentation for valve, regulator, and alarm adjustments and tests should be calibrated to a standard traceable to the National Institute of Standards and Technology (NIST), at a minimum of every 3 years.

4. Storage

Respirators shall be stored in a manner that will protect them against physical and chemical agents such as vibration, shocks, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. Respirators shall not be stored in such places as lockers and tool boxes, unless they are protected from contamination, distortion, and damage. Emergency and rescue respirators that are placed in the work areas shall be quickly accessible at all times, and the storage cabinet or container in which they are stored shall be clearly marked.

5. Assurance of Breathing Air Quality

Compressed gaseous air, compressed gaseous oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Compressed gaseous air shall meet at least the requirements of the specification for Type I-Grade D breathing air, and liquid air shall meet at least the requirements for Type II-Grade B breathing air as described in ANSI/CGA G-7.1-1989.

The CGA designation for Grade D and Grade E breathing air is as follows:

- Grade D breathing air, as per ANSI/CGA G-7.1-1989, shall contain between 19.5 and 23.5 percent oxygen with the balance predominantly nitrogen, a maximum of 5 mg/m^3 oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, and a maximum of 1,000 ppm carbon dioxide.

- Grade E breathing air, as per ANSI/CGA G-7.1-1989, shall contain between 20 and 22 percent oxygen with the balance predominantly nitrogen, a maximum of 5 mg/m^3 oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, a maximum of 500 ppm carbon dioxide, and 25 ppm total hydrocarbon content (as methane).

- Note: The quality verification for oil is not required for synthesized air whose oxygen and nitrogen components are produced by air liquefaction. Carbon monoxide quality verification is not required for Grade D breathing air if synthesized air when nitrogen component was previously analyzed and meets National Foundry (NF) specification and when the oxygen component was produced by air liquefaction and meets United States Pharmacopeia (USP) specification.

Compressed gaseous air may contain low concentrations of oil introduced from equipment during processing or normal operation. If high-pressure oxygen passes through an oil- or grease-coated orifice, an explosion or fire may occur. Therefore, compressed gaseous oxygen shall not be used in supplied air respirators or in open-circuit type self-contained breathing apparatus that have previously used compressed air. Oxygen concentrations greater than 23.5 percent shall be used only in equipment designed for oxygen service or distribution.

The dew point of air used to recharge self-contained breathing apparatus shall be –65 degrees F or lower (less than 25 ppm water vapor). The driest air obtainable (dew point of –100 degrees F or lower) should be used for recharging SCBA cylinders to be used in environments with ambient temperatures below –25 degrees F. The dew point of breathing air used with supplied air respirators should be lower than the lowest ambient temperature to which any regulator or control valve on the respirator or air-supplied system will be exposed.

Breathing air couplings shall be incompatible with outlets for nonrespirable plant air or other gas systems to prevent inadvertent servicing of supplied air respirators with nonrespirable gases. **It is recommended that Foster or Hansen fittings be reserved for breathing air systems.** Breathing air outlets shall be labeled.

Breathing air may be supplied to supplied air respirators from cylinders or air compressors. Cylinders shall be tested and maintained in accordance with applicable DOT specifications for shipping containers (49 CFR 173 and 178). Breathing gas containers shall be marked in accordance with ANSI/CGA C-4-1990. Specific test recommendations for purchased breathing air are given in the following table.

Method of Preparation	Analysis Recommended
Compression: Supplier does not fill cylinders with any other gases.	Check 10% of cylinders from each lot for ppm CO and odor.
Compression: Supplier fills cylinders with gases other than air.	Analyze all cylinders for percent oxygen. Check 10% of cylinders from each lot for ppm CO and odor.
Reconstitution.	Analyze all cylinders for percent oxygen. Check 10% of cylinders from each lot for ppm CO and odor.

A compressor shall be constructed so as to avoid entry of contaminated air. For all air compressors, including portable types, the air intake location shall be carefully selected, and monitored closely to ensure continued quality of air supply to the compressor. The system shall be equipped as necessary with a suitable in-line air-purifying sorbent bed and filter to further assure breathing air quality. Maintenance and replacement/refurbishment of compressor and associated air-purifying/filter media shall be performed periodically, by trained personnel following manufacturer's recommendations and instructions.

As part of acceptance testing, and prior to initial use, representative sampling of the compressor air output shall be performed to ensure that it complies with the requirements in Paragraph 1 of this section. To ensure a continued high-quality air supply, and to account for any distribution system contaminant input, a representative sample should be taken at distribution supply points. Samples should be collected on a periodic basis, as directed by the Program Coordinator. Specific test recommendations are given in the following table.

Type/Sample	Oil Lubricated	Non-Oil Lubricated	Combustion Engine Powered
Water Vapor	☒	☒	☒
Carbon Monoxide	☒		☒
Condensed Hydrocarbon	☒		☒
Carbon Dioxide			☒
Odor	☒	☒	☒

NOTES:

1. When using air compressors, intake location shall be carefully selected and monitored closely to ensure air supplied to the compressor is of adequate quality.

2. No frequency for periodic checks of air quality is specified, due to wide variation in equipment types, use, working environments, and operating experience.

3. Continuous monitoring of temperature and carbon monoxide are not required.

4. For non-oil lubricated compressors that operate at less than 35 psi, no sampling for water is required.

5. These requirements apply to systems designed for breathing air, other air-supply systems need to be evaluated on a case-by-case basis for the type and frequency of testing.

Further details on sources of compressed air and its safe use can be found in CGA G-7-1988.

PROCEDURE

Subject: MOTOR VEHICLE OPERATION: GENERAL REQUIREMENTS

1.0 PURPOSE AND SUMMARY

This procedure prescribes the general requirements for the operation of motor vehicles on company business. All operators of company owned, leased, and rented vehicles, as well as personal vehicles used on company business, are covered by this procedure. U.S. Department of Transportation (DOT) regulated personnel must also comply with the guidelines contained in Procedure HS810. Key elements of this procedure include:

- All employees who drive or may drive on company business must be familiar with the requirements of this procedure and certify their acceptance of the Company Rules for Motor Vehicle Operation (Attachment 2). In addition, the most current version of Attachment 2 must be signed annually during each employee's performance review.

- All new hire candidates shall complete the Pre-employment Driving Record Certification (Attachment 3). This certification will be evaluated via the established point system to determine driving privilege status.

- Employees must report all vehicular citations incurred while on company business to their supervisor. Once reported, the established evaluation criteria in Section 5.4 will be used to determine corrective actions.

- Employees utilizing vehicles while on company business are required to review this procedure and attend a company-designated driver training class.

- Requests for the re-instatement of denied or revoked driving privileges can be made to the appropriate business line health and safety manager.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Chargeable Vehicle Accident - Any at-fault vehicle accident meeting any one of the following criteria:

- An individual other than an employee of the company is a party in the accident.
- Property owned by a person or entity other than the company is damaged.
- When only company employees, company owned or leased (not rented) vehicles, and property is involved and damage exceeds $1,000.00.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Motor Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. This includes personal vehicles operated on company business. For the purpose of this procedure, off-road vehicles, such as earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles.

5.0 TEXT

5.1 Company Rules for Motor Vehicle Operation

All employees who will or may be required to operate a company owned, leased, or rented motor vehicle or a personal vehicle used on company business shall acknowledge acceptance of the Company Rules for Motor Vehicle Operation (Attachment 2) prior to such operation. The signed form shall be retained in the employee's personnel file. Each year during performance appraisals, covered employees shall be required to sign a copy of the most current Company Rules for Motor Vehicle Operation, which will then replace the previous copy in the personnel file.

5.2 Pre-employment Evaluation

The local Health and Safety Assistant shall distribute a copy of this procedure to all new hire candidates for the completion of Attachments 2 and 3. Information provided shall be evaluated via the point system in Section 5.3, and the hiring manager advised regarding any hiring or driving privilege restrictions that may apply. Hiring of persons with regular driving duties (e.g., field technicians and leadmen, sales persons, or others with assigned company motor vehicles) may only proceed after the information contained in Attachment 3 is evaluated.

Once Attachment 3 is completed, it is to be faxed to the Corporate Health and Safety Department at (412) 858-3976. The driving status of the prospective employee will be reported to the appropriate Human Resources Department in two to three working days. The local Health & Safety Assistant will notify the appropriate Human Resources manager when the attachments are not returned.

Discrepancies between the certified driving record report and Attachment 3 shall be reviewed with the prospective employee. Deliberate falsification of driving record information will disqualify prospective employees from being hired.

5.3 Pre-employment Driving Record Point System

The following point system will be used to evaluate the driving record of all new hire candidates that can reasonably be expected to operate a motor vehicle during their employment. For contested accidents or citations, conviction/settlement dates shall be used to determine point system applicability.

Pre-employment Driving Record Point System

Description	Assigned Point Value
Overweight, loss of load, vehicular equipment infraction, etc.	1
Moving violation: speeding, failure to stop, failure to signal turn, etc.	2
At-fault accident	3
Major citation: reckless driving, hit and run, suspended license, speed contest, open container, etc.	6
Driving under the influence	8

If a new hire candidate has accumulated three (3) points or less in the last twelve (12) months or five (5) points or less in the last twenty-four (24) months, they will be given the privilege to drive motor vehicles on company business without restrictions.

If they accumulate four (4) to six (6) points in the last twelve (12) months or six (6) to eight (8) points in the last twenty-four (24) months, they will be placed on probation for a period of twelve (12) months. They will be afforded the privilege to drive motor vehicles on company business during this probationary period. Any company-related driving infractions (i.e., speeding tickets, at-fault accidents, citations, etc.) accumulated during this probationary period will result in termination of the privilege to drive a motor vehicle on company business.

If the new hire candidate has accumulated seven (7) to eleven (11) points in the last twelve (12) months or nine (9) to fifteen (15) points in the last twenty-four (24) months, they will not be eligible for company driving privileges. Employment can only be offered with the strict understanding of denial of the privilege to drive motor vehicles on company business. After the first twelve (12) months of employment, the employee can petition the Vice President, Health and Safety or his/her designee for reconsideration of driving privileges.

The accumulation of twelve (12) points or more in the last twelve (12) months or sixteen (16) points or more in the last twenty-four (24) months will preclude employment.

5.4 Employee Evaluation Criteria

All employees who may operate a motor vehicle on company business will become familiar with the requirements of this procedure, complete the currently-designated company driver training class, and complete Attachment 2 prior to such operation. The employee driving evaluation criteria is based upon infractions incurred while on company business. It is imperative that employees notify their supervisors within 24 hours of a work-related citation or accident. Once notified, the supervisor will ensure the completion of Attachment 4, forward it to the appropriate Human Resources Department, and initiate one of the following corrective actions.

5.4.1 Minor Citation

When an employee is given a minor citation (i.e., speeding ticket, moving violation, failure to signal turn, loss of load, etc.), the employee's supervisor will meet the with employee to discuss the corrective action that must be taken so that further violations do not occur. At a minimum, the supervisor shall require the employee to attend a recognized course in defensive driving on his/her own time. The cost of this training will be borne by the employee. The supervisor will provide written direction to the employee regarding the assigned corrective action(s). The supervisor will forward a copy to the appropriate Human Resources Department for inclusion in the employee's personnel file.

5.4.2 Major Citation

When an employee is given a major citation (i.e., reckless driving, suspended license, hit and run, speed contest, etc.), the supervisor will hold a meeting with the employee, at which time the supervisor will complete the company Disciplinary Action Form (Procedure HR207) thereby informing the employee that any additional infractions will lead to more severe disciplinary action. In addition, the employee will be required to attend a recognized defensive driving course on his/her own time and will be suspended from work for one day without pay. A copy of the Disciplinary Action Form shall be forwarded to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.3 Failure to Notify

Should an employee fail to notify his/her supervisor of a work-related citation or accident within 24 hours of occurrence, his/her company driving privilege will be revoked. The supervisor will also take disciplinary action that is appropriate for the unreported event. If the unreported event is either an at-fault accident or driving under the influence case, the termination process will be initiated. All disciplinary actions shall be documented to the employee by the supervisor. This copy, and any written response by the employee, shall be forwarded to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.4 At-Fault Accident

Whenever an employee operating a company owned/leased/rented vehicle or their personal vehicle on company business is involved in an at-fault vehicle accident, an Accident Review Board shall be convened and recommend the corrective action to be taken. At a minimum, the action shall include the completion of a recognized driver safety course on their time and at their expense. All disciplinary actions resulting from at-fault vehicle accidents will be reviewed for consistency by the appropriate Safety Council.

Depending upon the circumstances and severity of the accident, termination of the employee can be considered. As above, this must be approved by the appropriate Human Resources Department. All communication to the employee regarding the accident and resulting action shall be in writing with a copy to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.5 Driving Under the Influence

Whenever an employee is convicted or pleads no contest to a company-related driving under the influence charge, he/she will be immediately terminated.

5.5 Training

All employees who will, or may reasonably be expected to, drive a company owned/leased/rented vehicle shall review this procedure and complete the currently-designated company driver training class prior to such operation. This class is designed to be locally taught and must include the following elements: federal/state/local driving rules, company driving rules, emergency/accident procedures, defensive driving techniques, and specific guidelines on the vehicle(s) to be operated. Locations conducting this class shall provide the Knoxville Health and Safety Training Department with a copy of the course attendance sheet.

5.6 Reinstatement of Driving Privilege

Any employee who has had his/her privilege to drive a motor vehicle on company business revoked or denied, and who desires to reinstate this privilege, must apply to the business line health and safety manager for reinstatement. The business line health and safety manager shall specify a rehabilitation program (if applicable), an external safe driving course, and any other requirements which he/she deems appropriate. Once the employee completes the program, documentation of successful completion must be formally presented to the Vice President, Health and Safety, or his/her designee. If the documentation is accepted, the driving privilege may be reinstated.

Reinstatement of the driving privilege may occur one (1) time, at the discretion of the Vice President, Health and Safety or his/her designee. If employee driving performance leads to a subsequent revocation of this privilege, such <u>revocation shall be permanent</u>.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HR207 Employee Disciplinary Action
HS013 Health and Safety Procedure Variances
HS020 Accident Prevention Program: Reporting, Investigation, and Review
HS810 Motor Vehicle Operation: Federal Motor Carrier Safety Regulations for Driver Qualifications

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Company Rules for Motor Vehicle Operation
3. Pre-employment Driving Record Certification
4. Notification of Work-Related Citation

ATTACHMENT 1

MOTOR VEHICLE OPERATION: GENERAL REQUIREMENTS RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*					
		Local Health & Safety Assistant	**Business Line Health and Safety Manager**	**Supervisor**	**Accident Review Board**	**Corporate Health and Safety**	**Vice President, Health and Safety**
Issue, Revise, and Maintain This Procedure	3.1						X
Ensure Employees Complete Attachment 2	5.1			X			
Distribute HS800 to New Hire Candidates for Completion of Attachments 2 and 3	5.2	X					
Request Evaluation of New Hire Driving Record	5.2	X					
Obtain Driving Record and Determine Driving Status	5.2					X	
Initiate Corrective Actions	5.4			X			
Ensure Completion and Distribution of Attachment 4	5.4			X			
Accident Review	5.4.4				X		
Ensure Drivers Meet Training Requirements	5.5			X			
Specify Program for Reinstatement of Driving Privilege	5.6		X				
Reinstatement of Driving Privilege	5.6						X

ATTACHMENT 2

COMPANY RULES FOR MOTOR VEHICLE OPERATION

1. Prior to motor vehicle operation, all motor vehicle operators are required to provide the company with current documentation of licensing for the motor vehicle(s) to be operated. Supervisors shall review and approve said documentation.

2. The motor vehicle operator is responsible for the vehicle, and for conducting a pre-trip inspection prior to use (including load, if applicable). No vehicle with any mechanical defect which endangers the safety of the driver, passengers, or the public shall be used.

3. All vehicles, other than automobiles, shall have small convex mirrors attached to the side mirrors.

4. The operator is responsible for complying with all state and local traffic laws, as well as customer regulations concerning motor vehicle operation.

5. The operator and all passengers shall use seat belts <u>at all times</u> when the vehicle is in motion.

6. No employee shall operate a motor vehicle when abnormally tired, temporarily disabled, or under the influence of alcohol or drugs.

7. No employee shall allow a company owned, leased, or rented motor vehicle to be operated by an unauthorized employee or non-employee.

8. All employees shall drive defensively at all times.

9. No employee shall drive beyond any barricades or into any area with designations such as “HAZARDOUS” or “DO NOT ENTER.”

10. Use caution when driving through congested areas, or near where personnel and equipment are working.

11. Whenever possible, a spotter shall be used for backing all vehicles. This may be a fellow company employee, or a non-company employee who is willing to help.

12. Unless required, such as on a client's property, keys shall not be left in an unattended vehicle.

13. Employees shall not leave the driver's seat of a vehicle while the motor is running. Exemption: Vehicles equipped with a power take-off device with parking brake set and chocks in place.

14. No motorcycles are to be operated on company business.

15. Radar detectors are prohibited in all company owned, leased, or rented vehicles.

16. Analytical samples will be transported in accordance with 49 CFR regulations. Regulated hazardous substances shall not be transported in personal vehicles.

17. In case of an accident, the following steps shall be taken:

    A. Stop.
    B. Call for medical assistance in case of injuries.
    C. Notify police.
    D. Complete Vehicle Accident Report and submit to your supervisor as soon as possible.

18. Whenever a vehicle is stopped upon the traveled portion of a highway or the shoulder of a highway, for any cause other than necessary traffic stops, the driver shall, as soon as possible, place or activate the warning devices with which the vehicle is equipped.

19. Employee must notify the supervisor within one (1) working day regarding work related citations, accidents, and license expiration, suspension, or revocation.

20. Before operating any company vehicle, the operator shall briefly walk around the vehicle to inspect for unsafe conditions or obstructions, and to check that the load (if applicable) is properly secured.

21. No employee is authorized to operate a company vehicle (including rentals) after having been on duty for a period of 16 hours. No employee may drive for more than 12 hours in any single on-duty period. Once either of these criteria have been met, a period of 8 consecutive hours off duty is required before driving duties may be resumed. These are maximum, not minimum, requirements and employees may be unfit to drive after shorter on-duty periods. Commercial DOT drivers are subject to the more restrictive hours of service regulations described in Procedure HS810.

22. Project-assigned hourly employees are not permitted to operate company owned, leased, or rented vehicles after 10:00 p.m. without written authorization from their supervisor.

I have read and understand company Procedure HS800 and the company Rules for Motor Vehicle Operation, and agree to abide by all requirements.

____

Employee's Name (Printed)	Employee's Signature	Date

ATTACHMENT 3

PRE-EMPLOYMENT DRIVING RECORD CERTIFICATION

DATE ______________ REQUESTOR ________________________ PHONE NO. ________________

CANDIDATE'S HOME DEPARTMENT NUMBER

	Assigned Point Value
Overweight, loss of load, vehicular equipment infraction, etc.	1
Moving violation: speeding, failure to stop, failure to signal turn, etc.	2
At-fault accident	3
Major citation: reckless driving, hit and run, suspended license, speed contest, open container, etc.	6
Driving under the influence	8

In the space provided below, please list all violations and accidents currently listed on your driving record by the state issuing your driver's license (include all states for which you have held a driver's license during the last two [2] years). Determine the number of points assigned from the table above, and write in column labeled "Points." Finally, write the sum total of all points where indicated.

Violations/Accidents	Driver License #/State	Date (mo/yr)	Points

Total Points _______

I hereby certify that the information provided is a complete and accurate statement of my driving record for the previous twenty-four (24) months. I authorize the company to obtain a copy of my driving record from the state of issuance of my license(s). I understand that falsification of data will disqualify me from being hired.

Driver's License No. ____________________________

State of Issuance ______________________

Expiration Date _________________________________

Date of Birth _________________________

S.S.N. _______________________________

New Hire Candidate Name (Printed)

____

____

Signature

Date

____

PLEASE FAX THIS FORM TO THE CORPORATE HEALTH AND SAFETY DEPARTMENT AT (412) 858-3976

ATTACHMENT 4

NOTIFICATION OF WORK-RELATED CITATION

This form is to be completed by employees incurring a work-related vehicular citation. Once complete, it is to be signed by the employee's supervisor and forwarded to the appropriate Human Resources Department for inclusion in the employee's personnel file.

Employee Name ______________________________ Employee No. __________ Date _________

Nature of Citation ____

____

Location of Citation (City, State) ____

Date/Time Citation Received ____

Is Citation Being Contested? ☐ No ☐ YesDetails ____________________________

____

____

Employee Signature ____ Date ___________

Corrective Action Being Taken ____

____

____

Supervisor Signature ____ Date ___________

PROCEDURE

Subject: FORKLIFT OPERATION

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the requirements for the safe operation, maintenance, and inspection of forklift-type powered industrial trucks. It is intended to address the requirements of Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.178, which regulates the operation and maintenance of forklifts. A copy of this procedure shall be conspicuously posted at a place frequented by forklift operators.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company - All wholly-owned subsidiaries of Shaw Environmental and Infrastructure, Inc. (Shaw E & I).

Qualified Trainer - An employee who has the knowledge, training, and experience necessary to train forklift operators and evaluate their competence.

5.0 TEXT

This procedure establishes the minimum safety standards for the inspection, operation, and maintenance of company owned and/or operated forklifts. It is not intended to apply to other types of powered industrial trucks such as those used primarily for earthmoving or over-the-road hauling.

5.1 Operation

Only employees who are actively participating in training or have been trained in accordance with Section 5.2 of this procedure will be permitted to operate company owned, rented, or leased forklifts. The following forklift operational rules will be observed by all company employees operating forklifts:

- Forklifts shall be operated within rated capacity at all times. All capacity, operation, and maintenance instruction plates, tags, or decals shall be maintained in legible condition and strictly followed.
- Stunt driving and horseplay are prohibited.
- Employees shall not be permitted to ride on the forks of forklifts.
- Employees shall not place any part of their bodies outside the running lines of a forklift or between mast uprights and other parts of the equipment.
- Operators will inspect the forklift prior to its operation and report any unsafe conditions to their supervisor. The forklift will not be put back into service until it has been repaired by a qualified mechanic. Refer to Section 5.5 of this procedure.
- Employees will not be allowed to stand, pass, or work under the elevated portion of any forklift, loaded or empty, unless it is effectively blocked to prevent it from falling.
- No forklift will be operated with a leaking fuel system.
- Only approved forklifts will be used in hazardous locations.
- Forklifts will not exceed authorized or safe speeds. Always maintain a safe distance from other vehicles, keeping the forklift under control at all times. All established traffic regulations shall be observed.
- The operator will look in the direction of travel and shall not move the forklift until certain that all persons are in the clear.
- Forklifts shall not be driven up to anyone standing in front of a bench or other fixed object of such size that the person could be caught between the forklift and the object.

- Grades shall be ascended or descended slowly. When ascending or descending grades in excess of 10 percent, loaded forklifts shall be driven with the load upgrade.

- Forks shall always be carried as low as possible, consistent with safe operations.

- When leaving a forklift unattended, the power shall be shut off, brakes set, the mast brought to the vertical position, the load engaging means left in down position, and key removed from the ignition and left in the custody of a qualified operator or supervisor. When left on an incline, the wheels shall be chocked.

- Forklifts shall not be operated on floors, loading docks, or platforms that will not safely support the loaded forklift. Caution shall be exercised while driving over wet or slippery surfaces.

- Forklifts shall not be driven in and out of trucks or trailers at unloading docks until such trucks are securely blocked and brakes set.

- A width of one foot shall be the minimum distance maintained from the forklift and the leading edge of any elevated platform, dock, freight car, or truck.

- A loaded forklift shall not be moved until the load is safe and secure.

- Extreme care shall be taken when tilting loads. Tilting forward with the load engaging means elevated shall be prohibited except when picking up a load. Elevated loads shall not be tilted forward except when the load is being deposited onto a storage rack or equivalent. When stacking or turning, backward tilt shall be limited to that necessary to stabilize the load.

- Forklift operators shall avoid making quick starts and sudden stops.

- Loads shall not be raised or lowered while the forklift is in motion.

- Since fuels for forklifts vary, the manufacturer's recommendations for fueling or battery charging will be followed. The recharging of batteries shall comply with 29 CFR 1910.178(g).

- Seat belts are required to be worn at all times a forklift is being operated.

- Forklifts will not be used to elevate personnel unless they have been specifically designed to do so and the platform meets the requirements established in 29 CFR 1910.67.

- Operators must always face the forklift when dismounting and always have two hands and one foot or vice versa in contact with the forklift.

- At cross aisles and other locations where vision is obstructed, the forklift operator shall slow down and sound the horn. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing.

5.2 Training

Every employee that operates a forklift shall be informed of the operating instructions contained in Section 5.1 and in the forklift's operating manual. Other practices dictated by the particular workplace in which the forklift will be used will also be covered. Training shall be provided at the time of initial assignment and at least once every three years thereafter. Training will also be refreshed whenever:

- The operator is involved in an accident or near-miss incident while operating a forklift;
- The operator has been observed operating a forklift in an unsafe manner;
- There are changes in the workplace that could affect safe operation; or
- The operator is assigned to a different type of forklift.

Training will be conducted by a qualified trainer or outside training resource familiar with forklift operations and will consist of a review of this procedure, the forklift's operating manual and a demonstration of operational skills. The evaluation of operational skills will be tailored to the employee's anticipated work environment. The employee will have to demonstrate that he/she knows and understands the forklift's functional features, is familiar with safety rules and regulatory requirements, and can demonstrate overall safe forklift operational skills. The trainer and employee will acknowledge completion of this training by signing the forklift training record provided as Attachment 2.

5.3 Inspection

The forklift operator is required to perform a daily pre-use inspection of the forklift they will be operating. If an unsafe condition is identified, a supervisor shall be immediately informed of the condition and the forklift not operated until adequate repairs have been made. Most forklift operation and maintenance manuals contain inspection checklists that can be used as a guide for the inspection. In the event that a particular forklift manual does not contain an inspection checklist, the form provided in Attachment 3 can be used. All manufacturer-recommended procedures shall be followed during inspections.

5.4 Standard Forklift Safety Features

The use of standard safety features is an important factor in safe forklift operation. Although forklifts need not be equipped alike, there are some mandated safety features that are required to be on all company owned or operated forklifts. These required safety features include:

- Backup alarm

- Portable fire extinguisher
- Horn
- Seat belt.

5.5 Maintenance

Only authorized personnel shall perform maintenance or repair activities on forklifts. Guidelines for the maintenance of forklifts are contained in the operations and maintenance manual developed for the specific make and model of forklift being maintained. All work shall be done in accordance with the manufacturer's guidelines. Because forklifts are typically used every day, it is particularly important for personnel to follow these manufacturer-established maintenance, lubrication, and inspection schedules. Special attention should be given to forklift control and lifting features such as brakes, steering, lift overload devices, tilt mechanism, and safety features.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS050 Company Employee and Subcontractor Training Requirements

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Employee Training Record - Forklift Training
3. Daily Forklift Pre-Use Inspection Checklist

ATTACHMENT 1
FORKLIFT OPERATION

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Forklift Operator	**Qualified Trainer**	**Vice President, Health and Safety**
Issue, Revise, and Maintain Procedure	3.1			X
Provide Training	5.2		X	
Receive Training	5.2	X		
Complete Attachment 2	5.2	X	X	
Daily Forklift Inspection	5.3	X		

ATTACHMENT 2

EMPLOYEE TRAINING RECORD
FORKLIFT TRAINING

NAME ________________ LOCATION ________________ SUPERVISOR ___________

EMPLOYEE NUMBER ______________ INITIAL OR REFRESHER TRAINING (CIRCLE ONE)

FORKLIFT MAKE/MODEL ____

- I have reviewed and agree to abide by the requirements established in the forklift operation procedure.
- I have reviewed, understand, and agree to abide by the forklift operational rules described in Procedure HS820 and the manufacturer's operating manual.
- I acknowledge that it is my responsibility to conduct a daily inspection of the forklift that I will be expected to operate.

EMPLOYEE SIGNATURE ______________________________ DATE _______________

- I have observed a demonstration of the forklift operational skills for the above employee and feel that they understand the forklift's operational features, are familiar with safety rules and operational requirements, and have demonstrated satisfactory operating skills.

INSTRUCTOR SIGNATURE _______________________ DATE _

A copy of this training record is to be forwarded to the Knoxville Health and Safety Training Department and the original maintained in the project/location file.

ATTACHMENT 3

DAILY FORKLIFT PRE-USE INSPECTION CHECKLIST

PROJECT/LOCATION NAME: ____________________

FORKLIFT MAKE/MODEL: ____________________

INSPECTION COMPLETED BY/DATE: ____________________

ITEM	⊗ ACCEPTABLE	NOT ACCEPTABLE	NOT APPLICABLE
Fire Extinguisher			
Mast			
Roller			
Forks			
Hydraulics			
Leaks			
Loose Fittings			
Fluid Levels			
Tires			
Excessive Wear			
Splits			
Missing Material			
Separation From Rim			
Loose/Missing Lug Nuts			
Fork Carriage			
Tilt Mechanism			
Gauges/Indicators			
Steering			
Lights			
Horn			
Backup Indicator			
Brakes			
Other Fluids			
Leaks			
Levels			
Power Source			
Battery			
Fuel System (Tank, Lines)			
Seat Belt			

If an unsafe condition is identified, a supervisor is to be immediately informed of the condition and the forklift not operated until adequate repairs have been made.

COMMENTS:

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APPENDIX C
ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Setup	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, and debris • Exit equipment slowly and maintain three point contact • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Struck By/Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds	Warning vests, hard hat, safety glasses, steel toe work boots	
	Pinch Points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Leather gloves	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Equipment/ Facility Setup (Cont.)	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Maintain tools in a safe condition • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow Health and Safety SH315, Control of Hazardous Energy and the Site-Specific Lockout/ Tagout/Try Plan	Lockout/Tagout Devices	Voltage meter or 'Tic' tracer
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Avoid manual lifting/carrying tasks		

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Setup (Cont.)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	
	Ladders	• Inspect ladders before use for mud buildup on treads • Clean mud from boots before climbing on ladders • Follow the three point of contact rule		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Burns Associated with Loading/ Unloading Equip-ment on Trucks	• Identify heavy objects for loading that may have hot surfaces • Allow objects to cool or cover hot surfaces with non-combustible material to protect workers from burns		
	Walking on Machine Tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		
	High/Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for Heat/Cold Stress in accordance with Health and Safety Procedures HS400 & HS401	Insulated clothing (subject to ambient temperature)	Meteorological Equipment

Equipment Required	Inspection Requirements	Training Requirements
• Forklifts/hand carts • Ladders • Hand Tools	• Daily equipment inspections as per manufacturers' requirements • Inspection of all emergency equipment (i.e., first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review SSHASP • Review operations/safety manuals for all equipment utilized

	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with Health and Safety Procedure HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment
	UXO	• UXO avoidance monitoring will be conducted by a UXO specialist prior to beginning activities • If UXO is encountered, cease all activities, mark the location, and notify the SS		

Equipment Required	Inspection Requirements	Training Requirements
• Survey equipment (rod, etc.) • Warning vests	• Equipment inspections • Inspection of all emergency equipment (i.e., first aid kits, fire extinguishers)	• Review SSHASP • Review site-specific AHA with all task personnel

ACTIVITY HAZARD ANALYSIS FOR CLEARING AND GRUBBING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing, Grubbing	Struck By/Against Heavy Equipment	• Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals	Hard hat, safety glasses, steel toe work boots	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, and debris • Clean mud and grease from boots before mounting equipment; watch for slippery/unstable ground when dismounting equipment • Exit equipment slowly and maintain three point contact		
	Handling Heavy Objects	• Observe proper lifting techniques • Use dozer or trackhoe to move logs and brush		
	UXO	• UXO avoidance monitoring will be conducted by a UXO specialist prior to beginning activities • If UXO is encountered, cease all activities, mark the location, and notify the SS		
	Eye Injuries	• Wear face shield, goggles when operating powered clearing/grubbing equipment	Face shield, goggles	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Close doors, windows on heavy equipment to prevent injuries from tree branches and other vegetation	Leather gloves	
	Insect/Snake Bites	• Review injury potential and types of snakes with workers • Avoid insect nests areas, likely habitats of snakes outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellent, wear PPE to protect against sting/bite injuries	Tyvek coveralls, duct tape bottom of coveralls to boots	

ACTIVITY HAZARD ANALYSIS FOR CLEARING AND GRUBBING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing, Grubbing (Cont.)	Contact Dermatitis	• Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants • Identify and review poisonous plants with workers • Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions	Tyvek coveralls, duct tape bottom of coveralls to boots	
	Operations of Power Clearing Tools (brush saws, weed whackers)	• Wear eye, face, hand, and hearing protection when operating power clearing equipment • Shut-off/idle power tools walking between work areas • Store flammable liquids in well ventilated areas, away from work areas • Shut off equipment during refueling • Prohibit smoking while operating clearing equipment • Provide ABC (or equivalent) fire extinguishers for all work	Face shield, goggles, cloth gloves, ear plugs, steel toe work boots	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	High/Low Ambient Temperature	• Monitor for Heat/Cold Stress in accordance with Health and Safety Procedures HS400 & HS401 • Provide fluids to prevent worker dehydration	Insulated clothing (subject to ambient temperature)	Meteorological Equipment
	Unstable Ground; Rollover of Equipment	• Identify path of travel before moving dozer or trackhoe and inspect area for stable ground • Clearly mark any unstable areas		
	Walking on Machine Tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		

ACTIVITY HAZARD ANALYSIS FOR CLEARING AND GRUBBING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing, Grubbing (Cont.)	Adverse Weather Conditions: - Lightning - High winds - Driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		

Equipment Required	Inspection Requirements	Training Requirements
• Excavator/trackhoe and/or dozer • Power clearing tools (brush saws, week wackers)	• Daily equipment inspections as per manufacturers' requirements • Inspect all safety equipment (fire extinguishers, first aid kits and eye washes)	• Review AHA with all task personnel • Review any potential site contaminants • Review operations/safety manuals for all equipment utilized • Review potential hazardous plants and insects/animals

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND UXO SCREENING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of Soil and UXO screening	Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Cease work immediately if unknown utility markers are uncovered • Use manual excavation within 3 feet of known utilities • Utility clearance shall conform with 29 CFR 1926.955 (high voltage >700 kV) 15 feet phase to ground clearance; 31 feet phase to phase clearance		
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Wear hard hats, safety glasses with side shields, or goggles with splash shields and steel-toe safety boots • Apply water spray to road surfaces to minimize/ eliminate fugitive dust	Tyvek coveralls, latex or rubber overboots, inner cotton glove liners (based on weather) or inner sample gloves and outer nitrile gloves	PID, LEL/O_2, and vinyl chloride detector tubes, as necessary
	Struck By/Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds • Park equipment in areas where operator can see clearly to dismount equipment		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND UXO SCREENING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of Soil and UXO screening (Cont.)	Slips, Trips, Falls	• Clear walkways, work areas of equipment, vegetation, tools, and debris • Mark, identify, or barricade other obstructions • Exit equipment slowly and maintain three point contact • Clean boot soles before climbing on equipment • Watch footing on the side of the embankment • Exit equipment slowly and maintain three point contact		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting	Warning vests, hard hat, safety glasses, steel toe work boots	
	UXO	• UXO avoidance monitoring will be conducted by a UXO specialist prior to beginning activities • If UXO is encountered, cease all activities, mark the location, and notify the SS		
	High/Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for Heat/Cold Stress in accordance with Health and Safety Procedures HS400 & HS401	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
	Struck/Struck By	• Use the right tool for the task at hand • Maintain personal balance when performing manual excavation • Concentrate on the work task being performed		

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND UXO SCREENING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of Soil and UXO screening (Cont.)	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		

Equipment Required	Inspection Requirements	Training Requirements
• Excavator • Shovels, probes • Dump trucks • PID LEL/O_2 and vinyl chloride detector tubes, as necessary	• Daily equipment inspections as per manufacturers' requirements • Excavation inspection/permit • Inspect all safety equipment (fire extinguishers, first aid kits and eye washes)	• Review AHA with all task personnel • Review SSHASP • Review operations/safety manuals for all equipment utilized • Review site-specific chemical hazards

ACTIVITY HAZARD ANALYSIS FOR Debris removal				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Equipment**	**Air Monitoring Devices**
Debris removal	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Wear hard hats, safety glasses with side shields, or goggles with splash shields and steel-toe safety boots • Apply water spray to road surfaces to minimize/ eliminate fugitive dust	Tyvek coveralls, latex or rubber overboots, inner cotton glove liners (based on weather) or inner sample gloves and outer nitrile gloves	PID, LEL/O_2, and vinyl chloride detector tubes, as necessary
	Struck By/Against Heavy Equipment,	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds • Park equipment in areas where operator can see clearly to dismount equipment		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Slips, Trips, Falls	• Clear walkways of equipment, vegetation, tools, and debris • Mark, identify, or barricade other obstructions • Exit equipment slowly and maintain three point contact • Clean boot soles before climbing on equipment • Watch footing on the side of the embankment • Exit equipment slowly and maintain three point contact		

ACTIVITY HAZARD ANALYSIS FOR Debris removal				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Equipment**	**Air Monitoring Devices**
Debris removal (Cont.)	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting	Warning vests, hard hat, safety glasses, steel toe work boots	
	High /Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for Heat/Cold Stress in accordance with Health and Safety Procedures HS400 & HS401	Insulated clothing (subject to ambient temperature)	Meteorological Equipment

Equipment Required	Inspection Requirements	Training Requirements
• Dozer • PID, LEL/O_2 and vinyl chloride detector tubes, as necessary	• Daily equipment inspections as per manufacturers' requirements • Excavation inspection/permit • Inspect all safety equipment (fire extinguishers, first aid kits and eye washes)	• Review AHA with all task personnel • Review SSHASP • Review operations/safety manuals for all equipment utilized • Review site-specific chemical hazards

ACTIVITY HAZARD ANALYSIS FOR BREAKING UP AND DISPOSAL OF CLAD COUNTER WEIGHTS

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Equipment	Air Monitoring Devices
Breakup and disposal of clad counter weights	Slips, Trips, Falls	• Clear walkways, work areas of vegetation, equipment, tools, debris, excavated material • Mark, identify, or barricade other obstructions • Wear rubber boots in areas of standing water, mud, marsh • Use three point contact when ascending/ descending heavy equipment • Park heavy equipment on level ground to avoid potential sprains/strains when ascending/ descending		
	Struck By/Against Heavy Equipment, Flying Debris, Protruding Objects	• Use reflective warning vests, caution flags when exposed to vehicular traffic • Place barricades to isolate equipment swing areas • Isolate areas under suspended loads • Make eye contact with operators before approaching equipment • Barricade or enclose the work area • Restrict entry to the work area to authorized personnel during work activities • Wear hard hats, safety glasses with side shields, face shields and goggles and steel-toe safety boots at all times • Understand and review hand signals	Hard hat, goggles and face shield or safety glasses, steel toe work boots	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR BREAKING UP AND DISPOSAL OF CLAD COUNTER WEIGHTS

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Equipment	Air Monitoring Devices
Breakup and disposal of clad counter weights (Cont.)	Handling Heavy Objects	• Observe proper lifting technique • Avoid sudden movements, jerking motions • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Prohibit running, jumping during geotextile deployment • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85 dBA TWA	Ear plugs	Sound Level Meter
	High /Low Ambient Temperature	• Monitor for Heat/Cold Stress in accordance with Health and Safety Procedures HS400 & HS401 • Provide fluids to prevent worker dehydration	Insulated clothing (subject to ambient temperature)	Meteorological Equipment

Equipment Required	Inspection Requirements	Training Requirements
• Excavator	• Daily equipment inspections as per manufacturers' requirements • Excavation inspection/permit • Inspect all safety equipment (fire extinguishers, first aid kits and eye washes)	• Review AHA with all task personnel • Review SSHASP • Review operations/safety manuals for all equipment utilized • Review site-specific chemical hazards

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination	Slips, Trips, Falls	• Clear walkways, work areas of equipment, vegetation, tools and debris • Mark, identify, or barricade other obstructions • Clean heavy objects of oil/grease or other slippery contamination before attempting to lift/remove • Wear gloves with grip improving surfaces for handling large, slippery objects • Clean up spills or water accumulation in walkways		
	Struck By/Against Heavy Equipment, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds	Warning vests, hard hat, safety glasses, goggles and face shield, steel toe work boots	
	Inhalation and Contact with Hazardous Substances and Splashes	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Wear hard hats, safety glasses with side shields, or goggles with splash shields and steel-toe safety boots	PVC rain suit or poly-coated Tyvek coveralls, inner sample gloves, outer nitrile gloves, latex boot covers, full face shield and goggles	
	Burns	• Wear proper gloves, face shield/safety goggles, shin and toe guards, and splash suits to protect workers from skin burns and injury when operating laser (high pressure washers) • Tape gloves to PPE sleeves to lessen the possibility of hat water entering gloves • Use hand tools to loosen connections and position body to avoid pressure discharge • Wear shin and toe guards to protect from burns, lacerations and similar injuries	Goggles and face shield, shin and toe guards	

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination (Cont.)	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid actions/activities that contribute to overexertion • Warm up muscles before engaging in manual lifting activities • Review lifting posture/techniques regularly at safety meetings		
	Sharp Objects/Cuts and Punctures	• Wear cut resistant work gloves when the possibility of injury may be caused by sharp edges/objects or working with hand tools • Guard or pad metal edges of objects frequently used (access panels, etc.) or manipulated/ bypassed during maintenance • Position heavy objects to avoid manipulation while cleaning • Get assistance and dry glove surfaces to improve grip during object manipulation while cleaning	Leather gloves	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Repetitive Strains	• Rotate job tasks on high vibration equipment • Report equipment that produces high vibration for inspection and maintenance • Wear vibration reducing gloves		

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination (Cont.)	Strains and Sprains	• Maintain a safe stance and body position operating pressurized equipment • Avoid rushing		
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with Health and Safety Procedure HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment
Equipment Required		**Inspection Requirements**	**Training Requirements**	
• Pressure washer		• Equipment inspections • Inspection of all emergency equipment (i.e., first aid kits, fire extinguishers)	• Review SSHASP • Review site-specific AHA with all task personnel • Review operation manuals for the pumps and related equipment	

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration	Struck By/Against Heavy Equipment, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times • Understand and review hand signals	Warning vests, hard hat, safety glasses, steel toe work boots	
	Slips, Trips, Falls	• Clear, walkways of equipment, tools, debris, other materials • Mark, identify, or barricade other obstructions		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person for manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	High/Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for Heat/Cold Stress in accordance with Health and Safety Procedures HS400 & HS401	Insulated clothing (subject to ambient temperature)	Meteorological Equipment

Equipment Required	Inspection Requirements	Training Requirements
• Bobcat or forklift for moving bulky loads • Grass seed	• Equipment inspections • Inspection of all emergency equipment (i.e., first aid kits, fire extinguishers)	• Review SSHASP • Review site-specific AHA with all task personnel • Review operation manuals for the pumps and related equipment

APPENDIX D
ROUTE TO HOSPITAL

APPENDIX E
HEALTH AND SAFETY PLAN
AMENDMENT DOCUMENTATION FORM

Site Specific Health & Safety Plan
Amendment Documentation

Project Name: Sites 3, 6, & 7 12 **Project No.** 838067

Amendment No. **Date:**

Amendment Addresses: **Sections:**

Task(s) Amendment Affects:.

Reason For Amendment:

Amendment:

Completed by: **Approved by:**

APPENDIX F
ACCIDENT PREVENTION PLAN

APPENDIX F

ACCIDENT PREVENTION PLAN

1.0 SIGNATURE SHEET

Plan Preparer:	______________________________
Program Health and Safety Manager	Robert A. Brooks, CSP (732) 469-5599 Ext. 681 (office)
Approved by:	______________________________
Program CIH	Dave Mummert, CIH (419) 425-6129(office)
Approved by:	______________________________
Project Manager	Taylor Sword (757) 363-7190

2.0 BACKGROUND INFORMATION

2.1 SHAW ENVIRONMENTAL AND INFRASTRUCTURE, INC. (SHAW E&I)

Contract No. N62470-97-D-5000
Task Order 0085

The principal tasks to be conducted are listed below:

- Site preparation
- Clearing and grubbing
- Excavation and UXO screening sites 3 & 6
- Debris removal site 7
- Breaking up and disposal of 11 steel clad counter weights
- Load out and disposal of surface scrap metal and construction debris
- Equipment decontamination
- Site restoration

2.2 SHAW E&I ACCIDENT EXPERIENCE

YEAR	EMR (Interstate)*	OSHA Recordable Incident Rate*
2001	0.54	2.5
2000	0.53	2.8
1999	0.53	3.3

* SHAW E&I

2.3 HAZARDOUS ACTIVITIES REQUIRING ACTIVITY HAZARD ANALYSIS*

- Site preparation
- Clearing and grubbing
- Excavation and UXO screening sites 3 & 6
- Debris removal site 7
- Breaking up and disposal of 11 steel clad counter weights
- Load out and disposal of surface scrap metal and construction debris
- Equipment decontamination
- Site restoration

*Shaw E&I's Activity Hazard Analyses are also referred to as Job Safety Analyses (JSAs) and are located in the Site Specific Health and Safety Plan Appendix C.

3.0 STATEMENT OF SAFETY AN HEALTH POLICY

3.1 CORPORATE POLICY STATEMENT (ATTACHED)

PROCEDURE

Subject: SAFETY

1.0 PURPOSE AND SUMMARY

It is the policy of Shaw Envirinmental and Infrastructure, Inc., to provide a safe and healthful workplace for all employees, subcontractors, and consultants in compliance with governmental requirements. Additionally, the requirements of our clients shall take precedence provided that their requirements exceed those of SHAW E&I Corporation and governmental regulations.

<u>We believe in two fundamental principles of safety: all accidents, injuries and occupational illnesses are preventable; and if an operation cannot be done safely, we will not do it</u>. To put these principles into practice, every associate will receive the appropriate training, equipment, and other resources necessary to complete assigned tasks in a safe and efficient manner.

Safety, industrial hygiene and loss prevention are the direct responsibility of all members of management, who must create an environment in which everyone shares a concern for their own safety and the safety of their associates. Safety shall take precedence over expediency or short cuts. It is a condition of employment that all employees work safely and follow established safety rules and procedures. No individual(s) may pose a direct threat to the health and safety of other individuals in the workplace.

Managers must conduct their businesses in compliance with governmental safety regulations and company procedures. All International Technology Corporation health and safety procedures shall be implemented for all SHAW E&I employees on all projects where SHAW E&I is the subcontractor, or a joint venture partner. If SHAW E&I is the prime contractor, SHAW E&I procedures shall be applied to all SHAW E&I and subcontractor personnel.

<u>The implementation of effective safety and health practices is a key measure of managerial performance</u>. Management, with the assistance of the internal health and safety professional staff, will conduct audits to assess the effectiveness of the safety program(s) in place, and to identify areas for improvement. All deficiencies shall be corrected promptly.

All injuries, occupational illnesses, vehicle accidents, and incidents with potential for injury or loss will be investigated. Appropriate corrective measures will be taken to prevent recurrence, and to continually improve the safety of our workplace.

4.0 RESPONSIBILITIES AND LINES OF AUTHORITIES

Safety responsibilities, accountability and lines of authority are discussed in Section 2.0 of the HASP. The Project Manager (PM), Site Supervisor (SS), Certified Industrial Hygienist (CIH), Health and Safety Manager (HSM) and Site Safety Officer (SSO) are responsible for formulating and enforcing health and safety requirements, and implementing the Site Specific Health and Safety Plan (HASP).

5.0 SUBCONTRACTORS AND SUPPLIERS

5.1 TBD

5.2 SUBCONTRACTOR/SUPPLIER COORDINATION AND CONTROL

SHAW E&I subcontractors will be screened for safety performance and compliance with Federal Alcohol and Drug testing requirements prior to being issued any contract for site work. SHAW E&I subcontractors will comply with the requirements for site safety as outlined in SHAW E&I Group Health and Safety Procedure HS011 (see Shaw E&I Health and Safety Program). The Site Superintendent/Supervisor will be responsible for the conduct and control of SHAW E&I subcontractors.

5.3 SUBCONTRACTOR/SUPPLIER SAFETY RESPONSIBILITIES

All subcontractor employees are subject to the same training and medical surveillance requirements as SHAW E&I personnel depending on job activity. All activities involving the potential for exposure to hazardous waste materials will require medical and training certification as mandated by 29 CFR 1910.120 and 29 CFR 1926.65. All subcontractor personnel will be required to sign in daily and be required to attend a daily meeting discussing operations and safety issues. All subcontractors involved in construction/remedial activities will complete a Subcontractor Pre-Job Safety Checklist prior to the start of work at the site. Subcontractors will submit Job Safety Analyses for their work activities to the SS. The subcontractor reports directly to the Project Manager. All incidents involving subcontractor employees shall be reported to the Site Supervisor and a copy of the subcontractor's injury/illness report shall be submitted to the SS within 24 hours.

SHAW E&I subcontractors are required to sign off and comply with all requirements of the SHAW E&I Site-Specific Health and Safety Plan and Accident Prevention Plan. Contractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment/ equipment maintenance will comply with all Naval Facility rules and regulations. Supplier personnel will not be permitted into contaminated areas unless training and medical surveillance is in accordance with 29 CFR 1910.120/1926.65. Contractors will not ride on tractors, forklifts or similar vehicles unless specific seats are provided. They will follow Facility hot work rules if hot work is required for vehicle or equipment maintenance. Trucks will be loaded and unloaded in a safe and effective manner and materials will be stored safely in designated locations only. Associated packaging will be properly disposed of and litter will not permitted to be scattered or blown from truck beds. Operators of mobile equipment on site must observe all traffic rules such as speed limits and right-of-ways of pedestrians.

6.0 TRAINING

6.1 SAFETY INDOCTRINATION SUBJECTS:

Outlines of the site safety orientation for SHAW E&I / sub-contract personnel and visitors are provided in Section 10.0 of the HASP.

6.2 MANDATORY TRAINING AND CERTIFICATIONS

Mandatory training and certifications are discussed in Section 10.0 of the HASP.
All personnel entering the exclusion zone will be trained in the provisions of this Accident Prevention Plan and be required to sign the HASP which includes this Accident Prevention Plan.

Site-specific training for SJCA TO 85 will include a review of potential site contaminants, Hazard Communication as per 29 CFR 1910.1200/1926.59, site physical and environmental hazards, emergency response and evacuation procedures, and emergency telephone numbers will be held at the site location by the SS and SSO before any site work activities begin. Although all SHAW E&I workers receive confined space training during initial 40 hour health and safety training, site specific training, including rescue procedures, will be conducted before any confined space entry is performed.

6.3 EMERGENCY RESPONSE TRAINING

All SHAW E&I personnel who have completed either the SHAW E&I 40 hour HAZWOPER Training are qualified as emergency responders per 29 CFR 1910.120/1926.65 (e)(3)(iv). Site Specific Emergency Response Procedures will be reviewed with all site personnel as a part of site indoctrination.

6.4 SUPERVISORY AND EMPLOYEE SAFETY MEETINGS

The SHAW E&I SS and/or SSO will conduct daily safety meetings at the start of each work shift for on-site personnel and will require subcontractors to follow similar meeting procedures or participate in the SHAW E&I daily safety meetings. Daily safety meetings will comply with HS051 (see SHAW E&I Health and Safety Program).

7.0 SAFETY AND HEALTH INSPECTIONS

7.1 SAFETY INSPECTIONS

The SHAW E&I Project Manager and Site Supervisors/ Superintendents are required to conduct bi-monthly inspections of their sites using the Project Safety Inspection Report according to HS021 (see SHAW E&I Health and Safety Program). SSO's are responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, equipment conditions and submitting them to SS. The SSO will discuss any necessary corrective actions with the SS and review new procedures. Copies of these reports are maintained on file at the project locations.

The SHAW E&I Health and Safety Manager (HSM) or his designated representative will periodically conduct site visits and perform Site Safety Assessments. These reports are kept on file at the Somerset, New Jersey, Office and are tracked in a database for each SHAW E&I Project Manager and Supervisor/ Superintendent, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses are compiled and provided to program management for review.

7.2 EXTERNAL INSPECTIONS/CERTIFICATIONS

SHAW E&I does not anticipate, but may consider the use of outside sources, to provide safety inspections on an as necessary basis.

As required, SHAW E&I safety equipment will comply with appropriate OSHA (Occupational Safety and Health Administration), NIOSH (National Institute for Occupational Safety and Health), ANSI (American National Standards Institute), ASTM (American Society for Testing and Materials), and US Coast Guard or other recognized certification organizations.

8.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

8.1 COMPANY SAFETY PROGRAM GOALS

SHAW E&I considers safety the highest priority during work at a site containing potentially hazardous materials and has established a goal of **zero incidents** for all projects. All projects will be conducted in a manner which minimizes the probability of near misses, equipment/property damage or injury. SHAW E&I will establish programs to recognize people and projects that demonstrate excellence in safety performance. SHAW E&I will use safety observation programs to identify and correct unsafe acts and conditions. Safety awareness programs will be used to provide continuous training and development of good safety practices. SHAW E&I site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. SHAW E&I will provide and enforce safety rules to protect employees, subcontractors, clients and the public.

8.2 SHAW E&I SAFETY INCENTIVE PROGRAMS:

A copy of the SHAW E&I Safety Incentive Award Program is provided at the project. The SHAW E&I Project Manager will develop a site-specific program for approval by the HSM and the Business Line Lead, within 10 days of project mobilization.

8.3 SHAW E&I EMPLOYEE SAFETY RESPONSIBILITY REQUIREMENTS

Each employee is responsible for personal safety as well as the safety of others in the area and is expected to participate fully in the ***Safety Improvement Process***, particularly the Safety Observation Program. The employee will use all equipment provided in a safe and responsible manner as directed by the SS. All SHAW E&I personnel will follow the policies set forth in the SHAW E&I Health and Safety Procedures HS001-999. Site personnel concerned with any aspect of health and safety shall bring it to the attention of the SS/SSO. If not satisfied, they should contact the HSM. All project personnel have the authority to stop work if in their judgement serious injury could result from continued activity. The SS and the SSO shall be notified immediately if this becomes necessary. To protect the health and safety of all personnel, employees that knowingly disregard safety policies/procedures may be subject to disciplinary actions up to and including termination. SHAW E&I Employee Safety Responsibility is fully detailed in HS010 Employee Safety and Health Work Rules (see SHAW E&I Health and Safety Program).
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8.4 MANAGERS AND SUPERVISORS SAFETY ACCOUNTABILITY

It is the duty of the first line supervisor to motivate employees to adhere to SHAW E&I's safety policy in each work situation. A first line supervisor for these purposes is defined as that person designated to give immediate on-site supervision to personnel involved in a task.

All supervisors shall have complete knowledge of the safe procedure for all jobs and tasks under their supervision or when in doubt, shall seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted.

Supervisors will:

- Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- Allocate sufficient time for the training and coaching of all employees to insure that everyone knows the correct procedure for safely accomplishing required tasks.
- Prevent new employees from performing any tasks until required training is completed.
- Immediately correct unsafe conditions, which involved SHAW E&I employees or contractors.
- Ensure that the employees are outfitted with and wear personal protective equipment as specified by this Accident Prevention Plan, site-specific health and safety plan, other SHAW E&I procedures or as directed by the SSO, CIH or HSM.
- Set a good safety example.
- Obtain the cooperation of employees and contractors.
- Provide a safe work environment for employees and contractors.
- Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- Report all accidents, near misses and property damage in accordance with the Incident Management and Reporting Procedure.
- Establish a safety culture, using the elements of the SHAW E&I Safety Improvement process, which promotes awareness, encourages participation and recognizes excellence.

9.0 ACCIDENT REPORTING

9.1 EXPOSURE DATA (MAN-HOURS WORKED)

The Vice President of Health and Safety tracks and maintains incident records as to Federal reporting requirements (OSHA 300 Log). Incident rates are reported monthly to the Vice President of Health and Safety. Incident Rates and Workers Compensation losses are tracked for each business line. LANTDIV incident rates are updated and reported monthly by the Program Health and Safety Manager.

9.2 ACCIDENT INVESTIGATIONS, REPORTS AND LOGS

The site supervisor conducts Accident/incident investigations. A report is completed by the site supervisor and is required to be reviewed and signed by the site safety officer and the Project Manager. The report must be submitted to the HSM within 24 hours. All incident reporting forms are provided in HS020.

9.3 IMMEDIATE NOTIFICATION OF MAJOR INCIDENTS

SHAW E&I will immediately notify the client of any major incident, including injury, fire, equipment/ property damage and environmental incident. A full report will be provided within 24 hours. The following procedure will be followed in response to any major personal injury.

9.3.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the site supervisor to alert him of a medical emergency situation. The work crew supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the injury, if known

The following actions will then be taken depending on the severity of the incident:

- **<u>Life-Threatening Incident</u>** — If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. SHAW E&I personnel will evacuate any injury within the EZ to a clean area for treatment by (EMS) personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.

- **<u>Non Life-Threatening Incident</u>** — If it is determined that no threat to life is present, the Site Safety Officer will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

  *NOTE: The area surrounding an accident site must not be disturbed until the Site Safety Officer has cleared the scene.

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravates the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.

- Alert emergency and off-site medical personnel to potential contamination; instruct them about specific decontamination procedures.

- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

10.0 MEDICAL SUPPORT

On-site Medical Support/Off-site Medical Arrangements are provided in Section 11 of the HASP.

11.0 PERSONAL PROTECTIVE EQUIPMENT

11.1 HAZARD ASSESSMENT PROCEDURES/WRITTEN CERTIFICATIONS FOR PERSONAL PROTECTIVE EQUIPMENT

Protection levels provided in the HASP will be established for the site work activities based on the levels of site contaminants and the scope of work. Once on-site, results of air monitoring and visual inspection of the work activities may indicate the need for changes in these PPE level(s). Any significant change in the PPE level will be approved by the SSO in consultation with the CIH and/or HSM. Personal Protective Equipment (PPE) selection criteria are outlined in HS 600 and HS601 (see SHAW E&I Health and Safety Program).

All personnel using respiratory protection will be cleared by a physician for use of a respirator and will be fit-tested to assure they can achieve an acceptable fit. Physician clearance and results of fit testing will be documented as required by HS100.

12.0 PLANS REQUIRED BY THE SAFETY MANUAL

12.1 HAZARD COMMUNICATION PROGRAM

The Site-Specific Hazard Communication Program is included Section 4.2 of the HASP. IT Hazard Communication Program complies with 29 CFR 1926.59/1910.1200 and is outlined in HS060 (see SHAW E&I Health and Safety Program).

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12.2 EMERGENCY RESPONSE PLANS

The Site-Specific Emergency Response and Contingency Plan is included in Section 9.0 of the HASP.

12.3 LAYOUT PLANS

Work zones are defined in Section 5.0 of the HASP.

12.4 RESPIRATORY PROTECTION PLAN

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need have been evaluated based on the site contaminants. Air monitoring will be conducted to confirm that respiratory protection levels are adequate (see Section 8.0 HASP). All respirator users will be OSHA trained in proper respirator use and maintenance. The SS and SSO will observe workers during respirator use for signs of stress. The SS, CIH, HSM, and SSO will also evaluate the implementation of the HASP, periodically, to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

12.5 LEAD ABATEMENT PLAN

Not Applicable

12.6 ASBESTOS ABATEMENT PLAN

Not Applicable

12.7 ABRASIVE BLASTING

Not Applicable

12.8 CONFINED SPACE

Confined Space Entry Procedures are outlined in IT Procedure HS300 (see SHAW E&I Health and Safety Program).

12.9 HAZARDOUS ENERGY CONTROL PLAN

Lockout/Tagout Procedures are outlined in HS315. (See SHAW E&I Health and Safety Program).

12.10 CRITICAL LIFT PROCEDURES

Not Applicable

12.11 CONTINGENCY PLAN FOR SEVERE WEATHER

Contingency plans for severe weather are included in Section 9.0 of HASP. A site Specific Hurricane Preparedness Plan is located in Appendix G of the HASP.

12.12 ACCESS AND HAUL ROAD PLAN

Not Applicable

12.13 DEMOLITION PLAN

Not Applicable

12.14 EMERGENCY RESCUE (TUNNELING)

Not Applicable

12.15 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

Not Applicable

12.16 COMPRESSED AIR PLAN

Not Applicable

12.17 FORM WORK AND SHORING ERECTION AND REMOVAL PLANS

Not Applicable

12.18 LIFT SLAB PLANS

Not Applicable

12.19 SSHP

The SHAW E&I Site Specific Health and Safety Plan is included with this submission.

12.20 BLASTING PLAN

Not Applicable

12.21 DIVING PLAN

Not Applicable

12.22 ALCOHOL AND DRUG ABUSE PREVENTION PLAN

SHAW E&I substance abuse procedures are outlined in IT HS101 - Drug, and Alcohol Testing.

13.0 CONTRACTOR INFORMATION TO MEET THE REQUIREMENTS OF THE MAJOR SECTIONS OF EM 385-1-1

In addition to this Accident Prevention Plan, SHAW E&I has prepared a Site-Specific Health and Safety Plan to meet the major requirements of USACE Manual 385-1-1. Additional procedures for major requirements are provided in the SHAW E&I Health and Safety Procedures Manual HS001-999.

APPENDIX G
HURRICANE PREPAREDNESS PLAN

HURRICANE PREPAREDNESS PLAN
FOR
Interim Remedial Action
Sites 3, 6, and 7
St Julien's Creek Annex (SJCA)
Chesapeake, Virginia

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Task Order 0085

Prepared by:

Shaw Environmental and Infrastructure, Inc.
(A member of The Shaw Group Inc.)

Taylor Sword
Project Manager

Robert Brooks, CSP
Program Health and Safety Manager

July 2002
Shaw E&I Project No. 838067

TABLE OF CONTENTS

1.0 INTRODUCTION

PURPOSE

This procedure outlines the general responsibilities and actions to be taken in preparation for and response to a hurricane or hurricane warnings at SJCA. All personnel should understand that predicting the occurrence and path of a hurricane is difficult, however the risk can be minimized and controlled by following the procedures in this plan.

SCOPE

This procedure is applicable to all contractor personnel, including Shaw E&I's subcontractors, temporary construction facilities, and remediation equipment present at SJCA.

DISCUSSION

This procedure provides information on how to protect personnel and property in the event of a hurricane. In the Tidewater Virginia area, attention must be paid to all hurricanes, since there is no way to determine with 100 percent accuracy whether a hurricane will actually hit the area until a few hours before landfall.

The following table demonstrates that the accuracy of forecasting where a hurricane landfall will occur is very low more than 24 hours in advance of a storm.

Hours Before Landfall	Maximum Probability Values
72 Hours	10 Percent
48 Hours	13-18 Percent
36 Hours	20-25 Percent
24 Hours	35-45 Percent
12 Hours	60-70 Percent

2.0 DEFINITIONS

The following definitions apply to various terms used in this document.

Conditions of Readiness (CORS):

Condition V - Destructive winds are possible at SJCA within 96 hours. Normal daily job-site cleanup and good housekeeping practices.

Condition IV - Destructive winds are possible at SJCA within 72 hours. Normal daily job-site cleanup and good housekeeping practices. Collect and store in piles or containers, scrap lumber, waste material, and rubbish for removal and disposal at the end of each work day. Maintain the construction site, including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all trash debris and other objects which could become missile hazards. Contact client representative for Condition requirements, updates, and completion of required actions.

Condition III - Destructive winds are possible at SJCA within 48 hours. Maintain Condition IV requirements. Begin securing the job-site for and taking those actions necessary for Condition I, which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Begin collecting and stowing all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to Condition II and continue action as necessary to attain Condition III readiness. Contact the weather station on base for weather and COR updates and completion of required actions.

Condition II - Destructive winds are possible at SJCA within 24 hours. Curtail or cease routine activities until securing operations are complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment and materials, or remove from job site. Expend every effort to clear all missile hazards and loose equipment from the job-site. Contact client representative for weather and COR updates and completion of required actions.

Condition I - Destructive winds are possible at SJCA within 12 hours. Perform and complete all remaining actions required for lower conditions of readiness. Secure the job-site and leave the government premises.

Destructive Winds - Generally winds reaching or exceeding the force of a tropical storm ($\geq$ 39 mph or 34 knots). Winds from any storm system (tropical or otherwise) that are determined to have the potential to cause property damage or personal injury which would warrant SJCA to initiate a Condition IV alert.

Hurricane Watch - An announcement for specific areas where a hurricane or an incipient hurricane poses a possible threat to a coastal area, generally within 36 hours.

Hurricane Warning - A warning that sustained winds of 74 MPH (64 knots) or higher, associated with a hurricane are expected in a specified coastal area in 24 hours or less.

Hurricane - A tropical cyclone in which the maximum sustained surface wind is 64 knots (74 MPH) or greater.

Missile Hazard - Any object that may become airborne during high winds.

Severe Weather - Any storm of tropical or non-tropical origin that has the capacity to produce destructive winds

Storm Surge - An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the storm.

Storm Tide - The actual sea level resulting from the astronomical tide combined with the storm surge. This term is used interchangeably with "Hurricane Tide."

Tropical Depression - A tropical low pressure system in which the maximum sustained surface wind is 33 knots (38 MPH) or less.

Tropical Storm - A tropical low pressure system in which the maximum surface wind ranges from 34 to 63 knots (39 to 73 MPH) inclusive. This is the strength at which the National Hurricane Center applies a name to the storm.

Tropical Storm Watch - Tropical storm conditions pose a threat to a coastal area generally within 36 hours.

Tropical Storm Warning - A warning for tropical storm conditions with sustained winds within the range of 39 to 73 MPH which are expected in a specified coastal area within 24 hours or less.

3.0 RESPONSIBILITIES

Project Manager – Taylor Sword

The Project Manager (PM) is responsible for ensuring that all adequate measures have been taken to prepare for hurricanes and to protect SHAW E&I site personnel and property in the event of a hurricane. The PM will ensure that ample resources are available to implement this plan and that all personnel are aware of this plan and their responsibilities.

Site Supervisor – Mark Pisarcik

The Site Supervisor (SS) will communicate all hurricane information to site personnel, and keep the site personnel continually informed of the measures to be taken. The SS is responsible for the coordination and direction of site equipment shut-down and will oversee the preparation of site facilities for any imminent storm. The SS will oversee the coordination of both pre- and post-storm operations and will ensure that the proper material, equipment, and supplies are utilized to implement this procedure.

Site Safety Officer – To Be Determined

The Site Safety Officer (SSO) will monitor weather information, including the National Weather Service probability values for landfall. The SSO will maintain the necessary emergency supplies, and will periodically tour the site to ensure that proper steps are being taken to protect site personnel and property. The SSO will develop the emergency contact list will be maintained in a site dedicated vehicle.

Note: When personnel identified in Section 3.0 leave the site, they are responsible for notifying the Project Manager of a designated back-up person. The back-up person will be instructed in their responsibilities in the event of a hurricane.

4.0 NORMAL OPERATING PROCEDURES

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be classified in accordance with NIOSH/OSHA/USCG/EPA'S document *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Each work area will be clearly identified using signs or physical barriers.

- Exclusion Zone
- Contamination Reduction Zone
- Support Zone

A log of all personnel visiting, entering or working on the site shall be maintained in a site dedicated vehicle. No visitor will be allowed in the EZ without showing proof of training and medical certification, per 29 CFR 1910.120(e), (f). Visitors will attend a site orientation given by the SSO and sign the HASP.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- Eating, drinking, chewing gum or tobacco, smoking is prohibited in the EZ/CRZs.

- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum, tobacco chewing or smoking .

- A buddy system will be used. Hand signals will be established to maintain communication.

- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance.

- Visual contact will be maintained between buddies on site when performing hazardous duties.

- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.

- All personnel must comply with established safety procedures.

- Proper decontamination procedures must be followed before leaving the site.

- All employees and visitors must sign in and out of the site.

5.0 EMERGENCY OPERATING PROCEDURES

Condition V - Early Preparedness

The SSO will notify the PM and SS when a tropical storm has been named and/or any severe weather has the potential to produce destructive winds at SJCA within 96 hours. This will initiate Condition of Readiness (COR) Condition V. This phase will continue until:

The storm or condition is downgraded
The storm track poses no threat to the site
Condition IV begins

During Condition V, the progress of the storm will be monitored and tracked. The client will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition V.

See Appendix A for the Hurricane Preparedness Responsibility Punch List - Condition V.

Condition IV - (Destructive winds are possible within 72 Hours)

This COR starts when SHAW E&I is notified by the client representative that severe weather is within 72 hours of posing a threat to the project location. The SSO will ensure that the following steps are taken:

Monitor the storm and inform the PM and SS of its progress
Check PPE supplies and equipment to determine if any shipments are required or if pending shipments should be advanced or postponed

During Condition IV, the progress of the storm will be continuously monitored and tracked. The SS will instruct site personnel to begin general cleanup of all loose materials which may pose a hazard during high winds or rain. This will include removal of all debris, trash, and other debris that may become missile hazards. All form lumber will be stacked in neat piles less than 4 feet high. The client representative will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition IV.

The SS will keep all site personnel advised of the status of the storm and site preparation activities. Due to the urgency and amount of work involved in preparing for a threatening storm, all construction operations that might interfere with securing operations, such as starting a major excavation, will cease.

The SS will ensure that the following steps are taken:

Fill fuel tanks in all equipment on-site

Secure stockpiled material on-site.
Review requirements for Condition II with all site personnel.
Maintain condition IV requirements.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition IV.

Condition III - Tropical Storm Warning (Destructive winds are possible Within 48 Hours)

This COR starts when severe weather places the project site under a tropical storm warning. Condition III activities will also start if a threatening tropical storm is upgraded to a hurricane, or a severe storm approaching SJCA has generated destructive winds in other locations. The PM, SS, and SSO will determine when to cease all operations based upon current weather conditions and/or as directed by the client representative. If the storm or Condition is downgraded, the PM, SS, and SSO will meet with the client to decide if a downgrade of the COR is appropriate. Actions for Condition III will be maintained and the following shall also be completed:

Machinery, tools, equipment, and materials will be secured or removed form the site.
Take actions to secure job-site necessary for Condition I that cannot be completed within 18 hours.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition III.

Condition II - Destructive Winds are anticipated <u>within 24 hours</u>.

Condition II begins when destructive winds are anticipated within 24 hours and/or as directed by the ROICC. The PM, SS, and SSO will determine when to demobilize from the site based upon weather conditions. During this phase:

The SS will:

Secure machinery, tools, equipment and materials or remove them from the job-site.
Conduct a roll call of personnel on-site and inform the SSO
Notify personnel, on leave, of schedule changes
Personnel needing to leave the project to attend to personal matters will notify their SS immediately.
Heavy equipment will be secured according to the manufacturer’s recommendations
All small field equipment will be secured

The SSO will ensure that the following step is taken:

All visitors from the site are evacuated
Make a final site walk-through to determine that the site is secure and clear all missile hazards from the job-site
Inform the Project Manager that all personnel are being released from the site

If the storm or Condition is downgraded, the PM, SS, and SSO will meet to decide if a downgrade of the phase is necessary.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition II.

Condition I - Destructive winds are anticipated within 12 hours.

Complete all remaining actions required for lower conditions of readiness.
Secure job-site access and evacuate to safe refuge.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition I.

Resume Site Operations

The PM will contact the client representative to determine when site operations will resume. Although the hurricane/severe weather has passed, hazards may still exist because of water damage, other hazardous conditions, dangers from electric shock, poisonous snakes, etc.

The SSO will conduct a damage survey with the PM and SS. Photographs of the storm damage at the site will be taken by the SS. They will develop a prioritized recovery plan from the survey findings. Subsequently, all site personnel will be notified when it is safe to return to work. Required personnel and subcontractor expertise will be mobilized to the site to repair any damaged equipment.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Resume Site Operations.

6.0 DEBRIEFING

Following the return to work of site personnel, the Site Supervisor will conduct a debriefing with site personnel. The debriefing will accomplish the following objectives:

Finalize a recovery plan
Review the Hurricane Plan for effectiveness
Suggest and agree on improvements to the plan
Incorporate plan changes

When completed, the PM and SS will meet with site personnel to discuss any corrective actions or changes in this plan.

7.0 REFERENCES

The following references and sources of information may be consulted for additional guidance on hurricane preparedness and response.

Disaster Planning Guide for Business and Industry, Federal Emergency Management Administration (FEMA).

U.S. Department of Commerce; National Oceanic and Atmospheric Administration (NOAA)

ATTACHMENT A
HURRICANE PREPAREDNESS RESPONSIBILITY CHECKLISTS

HURRICANE PREPAREDNESS CHECKLIST

Condition V

Date/Time Entered Condition V:____________________________

Severe Weather/Tropical Storm: ____________________________

Action Items

- ☐ Project Manager Notified
- ☐ Track of Storm Poses No Threat
- ☐ Storm or Condition is Downgraded
- ☐ Upgrade to Condition IV

Storm Location

Date/Time:________________________ Date/Time:________________________

Location/Coordinates:_________________ Location/Coordinates:_________________

Date/Time:________________________ Date/Time:________________________

Location/Coordinates:_________________ Location/Coordinates:_________________

Condition V Action Items Complete:______________________

Date:______________

HURRICANE PREPAREDNESS CHECKLIST

Condition IV (Landfall within 72 hours)

Date/Time Entered Condition IV:______________________________

Action Items:

- ☐ Notify Project Manager
- ☐ Notify Project Superintendent
- ☐ Notify Site Personnel
- ☐ Assemble shift personnel to begin preparation
- ☐ Track storm on hurricane tracking map (Attachment C) (if applicable)

The Project Foremen will ensure the following steps are taken:

- ☐ Secure all heavy equipment located at the site in accordance with manufacturer's specifications. All equipment will be moved to a secured site location.
- ☐ All equipment fuel tanks will be filled.
- ☐ All subcontractors with equipment or supplies on-site will be notified to begin removal procedures

Condition IV Action Items Complete:______________________________
Date:______________

HURRICANE PREPAREDNESS CHECKLIST

Condition III (Landfall within 48 hours)

Date/Time Entered Condition III:______________________________

Action Items:

- [ ] Provide the status of the storm to site personnel on an hourly basis
- [ ] Take actions to secure job-site necessary for Condition I that cannot be accomplished in 18 hours
- [ ] Recheck all items on checklist IV to ensure they are complete (ie.: gas tanks are still filled)

See itemized equipment checklist (itemized list of equipment to be secured/removed and COR for action)

Condition III Action Items Complete:_____________________________
Date:______________

HURRICANE PREPAREDNESS CHECKLIST
Itemized Equipment Checklist, Condition III.

Equipment	Secure in Place	Remove from Project Site

HURRICANE PREPAREDNESS CHECKLIST

Condition II

Date/Time Entered Condition II:_______________________________

Action Items:

- ☐ Evacuate all visitors from the site
- ☐ Conduct a role call of site personnel and inform the SSO
- ☐ Check the status all incoming shipments of supplies and equipment
- ☐ Remove all unnecessary vehicles from the site
- ☐ Secure heavy equipment in accordance with manufacturer's specification
- ☐ Secure all valuable records and equipment
- ☐ Release personnel from the site
- ☐ Recheck all items on checklist IV and III to ensure they are complete (ie: gas tanks are still filled)

Condition II Action Items Complete:______________________________
Date:______________

HURRICANE PREPAREDNESS CHECKLIST

Condition I

Date/Time Entered Condition I:_______________________________

Action Items:

- ☐ Complete all action items for lower conditions of readiness
- ☐ Secure job-site access and evacuate to safe refuge

Condition I Action Items Complete:______________________________
Date:______________

ATTACHMENT B
EMERGENCY PHONE NUMBERS

SEE SECTION 9 OF THE SITE-SPECIFIC HEALTH AND SAFETY PLAN.

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ATTACHMENT C
HURRICANE TRACKING MAP

HURRICANE PREPAREDNESS CHECKLIST

Resume Site Operations

Date/Time Resume Site Operations:_______________________________

Action Items:

- ☐ Conduct a damage survey
- ☐ Notify all site personnel when to return to work
- ☐ Develop a prioritized recovery plan
- ☐ Inspect electrical equipment before re-energizing to detect and repair damage
- ☐ Provide bottled water for drinking until normal drinking water is deemed safe to drink
- ☐ Remove storm debris from site
- ☐ Notify client representative of the resumption of site activities

Resume Site Operations Action Items Complete:______________________________
Date:______________

APPENDIX H

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

I HAVE READ THE SITE-SAFETY PLAN FOR SJCA SITES 3, 6, &7 AND FULLY UNDERSTAND ITS CONTENTS.

Name	**Date**

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

I HAVE READ THE SITE-SAFETY PLAN FOR SJCA SITES 3, 6, & 7 AND FULLY UNDERSTAND ITS CONTENTS.

Name	**Date**

Appendix B
Field Sampling Plan

Field Sampling Plan
for
IRA at Sites 3, 6, and 7
St. Julien's Creek Annex
Chesapeake, Virginia

Prepared for:

Department of the Navy
Contract No. N62470-97-D-5000
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Project Manager

Roland Moreau
Program Manager

June 2002
Task Order 0085
Project No. 838067

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List of Acronyms

ASTM	American Society for Testing and Materials
°C	degrees Celsius
CAA	Clean Air Act
CAR	corrective action report
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
CLP	Contract Laboratory Program
CNO	Chief of Naval Operations
COC	Chain of Custody Form
CRM	certified reference material
CWA	Clean Water Act
DI	deionized
DOD	U.S. Department of Defense
DQO	data quality objectives
DRO	diesel range organics
EDD	electronic data deliverables
EPA	U.S. Environmental Protection Agency
ER,N	Environmental Restoration, Navy
FFA	Federal Facilities Agreement
FID	flame ionization detector
FS	feasibility study
FSP	Field Sampling Plan
G	glass
GC	gas chromatography
GC/MS	gas chromatography/mass spectroscopy
GRO	gasoline range organics
GW	groundwater
H_2SO_4	sulfuric acid
HASP	Health and Safety Plan
HCl	hydrochloric acid
HDPE	high density polyethylene
HNO_3	nitric acid
HPLC	high-performance liquid chromatography
ICB	initial calibration blank
ICP	inductively coupled plasma
ICS	interference check standard
ID	identification
IDW	investigation-derived waste
IR	Installation Restoration
IS	internal standards

LANTDIV	Department of the Navy, Atlantic Division
LCS	laboratory control sample
LIMS	Laboratory Information Management System
MB	method blank
MDL	method detection limit
mg/Kg	milligram per kilogram
mg/L	milligram per liter
MS/MSD	matrix spike/matrix spike duplicate
N/A	not applicable
NaOH	sodium hydroxide
$Na_2S_2O_3$	sodium thiosulfate
NELAP	National Environmental Laboratory Accreditation Program
NEPA	National Environmental Policy Act
NFESC	Naval Facilities Engineering Service Center
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
NPDES	National Pollutant Discharge Elimination System
OHM	OHM Remediation Services
OSHA	Occupational Safety and Health Administration
OVM	organic vapor monitor
P	polyethylene
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and completeness
PC	OHM project chemist
PCB	polychlorinated biphenyls
PDS	post digestion spike
PE	performance evaluation
PM	OHM project manager
ppb	parts per billion
ppm	parts per million
QA	quality assurance
QAM	laboratory quality assurance manual
QAO	quality assurance objectives
QAPP	quality assurance project plan
QC	quality control
QMS	quality management system
R	recovery
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RI	remedial investigation
RL	reporting limits
RPD	relative percent difference
SAP	sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act

SCS	Soil Conservation Survey
SI	site inspection
SJCA	St. Julien's Creek Annex
SOP	standard operating procedure
SOW	statement of work
SRM	standard reference material
SVOC	semi-volatile organic compound
SW-846	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
SWMU	solid waste management unit
TCLP	toxicity characteristic leaching procedure
TIC	tentatively identified compounds
ug/Kg	microgram per kilogram
ug/L	microgram per liter
USGS	U.S. Geological Survey
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
VOC	volatile organic compound

Preface

OHM Remediation Services (OHM) has been tasked by the Department of the Navy, Atlantic Division (LANTDIV) to perform various remedial actions at the St. Julien's Creek Annex, (SJCA), Chesapeake, Virginia. This Sampling and Analysis Plan (SAP) has been prepared as a deliverable under Contract Number N62470-97-D-5000, Task Order 0085. This SAP will apply to all site and laboratory activities performed under contract for SJCA. It establishes protocols to allow for comparability and defensibility of sampling and analytical data. It is intended to provide detailed documentation for procedures merely referenced in each task-specific SAP. The task-specific SAPs will provide all remedial and quality control limits to be used in data validation. Contract personnel should defer to the task-specific SAPs in cases where differences from this SAP in field or laboratory procedure are observed.

1.0 INTRODUCTION

This Field Sampling Plan (FSP) or Sampling and Analysis Plan (SAP) presents the procedures designed to achieve comparability and defensibility regarding the reporting and use of analytical data from different sites and events on the St. Julien's Creek Annex, (SJCA), Chesapeake, Virginia. The SAP provides assurance that data are collected, analyzed, reviewed, and reported in a consistent and representative manner.

2.0 PROJECT DESCRIPTION

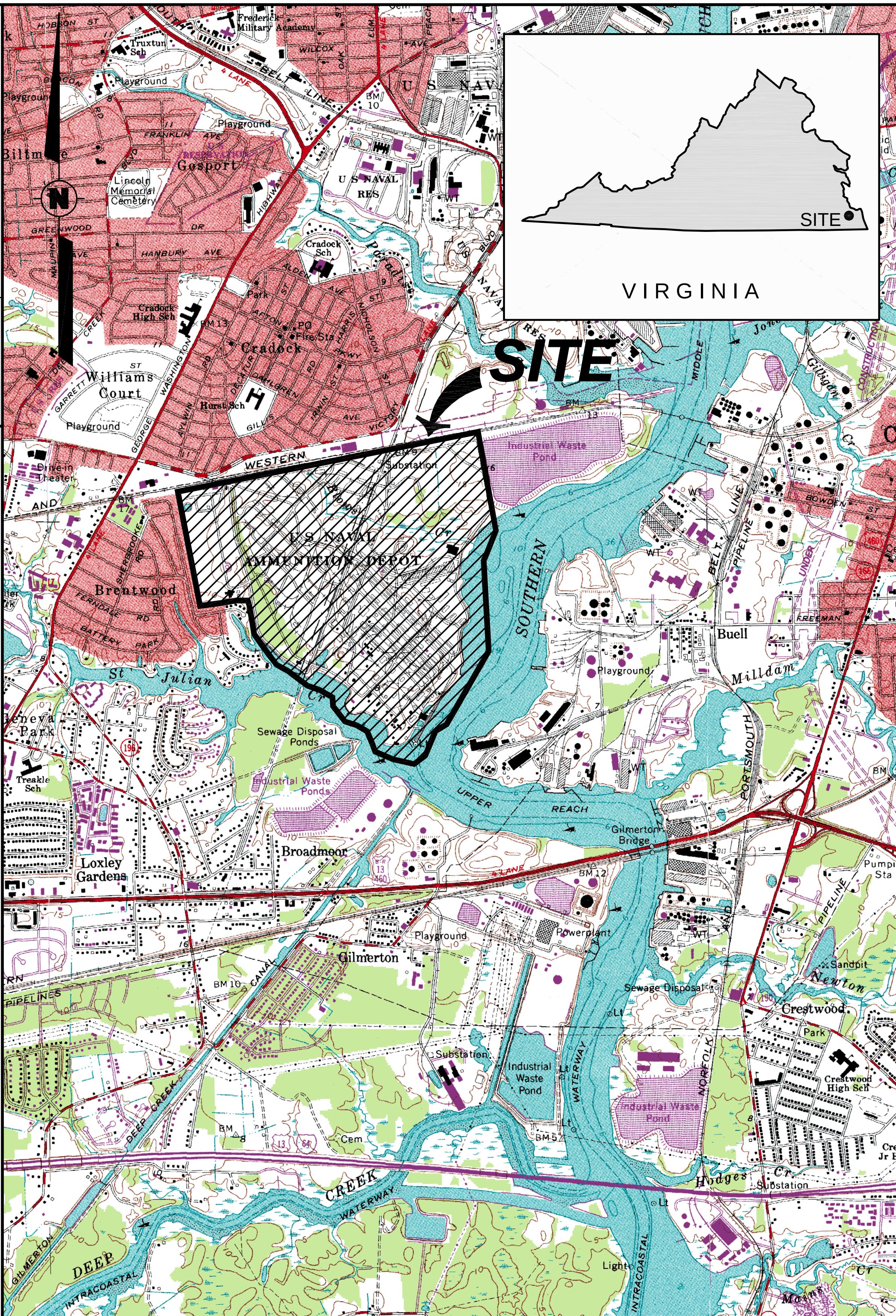
This Field Sampling Plan (FSP) for the St. Julien's Creek Annex, (SJCA), has been prepared by Shaw Environmental and Infrastructure (formerly OHM) for the Department of the Navy, Atlantic Division (LANTDIV) under Contract Number N62470-97-D-5000, Task Order 0085. It is relevant to all SJCA site and analytical activity performed by Shaw E&I or Shaw E&I-subcontracted personnel. The following sections of this FSP describe the general scope of the project, current remedial and monitoring activities, and procedures involved in sample collection. The associated QAPP addresses policies to be used by the fixed-base laboratory for delivering usable and legally-defensible data.

2.1 FACILITY LOCATION AND BACKGROUND

St. Julien's Creek Annex (SJCA) is a 490-acre parcel of Navy owned land located in the City of Chesapeake, Virginia. It is situated at the confluence of St. Julien's Creek and the Southern Branch of the Elizabeth River. (**Figure 2-1**).

2.2 SCOPE OF WORK

The rationale and approach for mobilizing and conducting field activities are addressed in various Work Plans that have been written by Shaw E&I for SJCA. Data quality objectives specific to each remedial and/or monitoring activity can be found in task-specific SAPs. This FSP gives detailed procedures for proper and representative sampling associated with the different proposed remedial activities to be performed at SJCA. Sampling of soil, sediment, surface water, ground water, air, and waste are addressed herein. There are also specific procedures to maintain consistency of documentation, sample shipment, field instrument calibration, and decontamination of equipment.



REFERENCE:

U.S.G.S. 7.5 MIN TOPOGRAPHIC MAP OF NORFOLF SOUTH VIGINIA, DATED 1965, PHOTOREVISED 1986, SCALE: 1" = 1/2 MILE.

S C A L E

0 .5 1 Mile

OFFICE Pittsburgh, PA

DRAWING NUMBER 836067–A2

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Plot Date/Time: 08/07/02 10:58am Image: o36076g3
Plotted by: SMITH_A Xref: .

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

REVISIONS

OHM Remediation Services Corp.

PROJECT NO. 838067

DESIGNED BY	TS	8/2/02	CHECKED BY	P. Verma	8/2/02
DRAWN BY	TFR/LDB	8/2/02	APPROVED BY	J. Sloss	8/2/02

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

ATLANTIC DIVISION

NORFOLK, VIRGINIA

NAVAL STATION ST. JULIAN'S CREEK ANNEX CHESAPEAKE, VIRGINIA

REMEDIAL ACTION SITES 3, 6, AND 7

SITE LOCATION MAP

SCALE: AS SHOWN

SIZE: A

DELIVERY ORDER NO. 085

CONSTR. CONTRACT NO. N62470–97–D–5000

NAVFAC DRAWING NO.

Figure 2-1

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

All project personnel, including field, laboratory, and subcontractor personnel are subject to the requirements of the SAP. The key positions and identities are described in detail in the task-specific FSPs. Following is an overview of responsibilities provided for this scope of work.

3.1 REGULATORY REQUIREMENTS

The CERCLA National Priorities List status requires that activities at SJCA be sanctioned by the United States Environmental Protection Agency (EPA), Region III, the Virginia Department of Environment, Quality, and the United States Department of the Navy. The primary contractor reports directly to the Department of the Navy, Atlantic Division (LANTDIV). LANTDIV personnel will facilitate the project from beginning to end, ensuring that environmental impacts are investigated, and providing the necessary interface with the regulatory agencies and contractors selected to support the project efforts in meeting the projects objectives. CERCLA/Resource Conservation and Recovery Act (RCRA) corrective actions will be developed and implemented as necessary to protect public health and the environment.

3.2 PRIMARY CONTRACTOR TASKS

Shaw E&I as the primary contractor is responsible for the overall implementation of this SAP pertaining to the remedial actions at Sites 3, 6, and 7 at SJCA. In order to achieve the objectives of the SAP the contractor is required to under certain circumstances obtain samples and perform analyses in accordance with the procedures of this SAP. The direction of the contractor activities is included under the responsible charge of the cognizant project manager. The Shaw E&I project manager serves as the focal point for control of all project activities. The PM will be supported by the project team, which will provide reviews, guidance, and technical advice on project execution issues. The project team will consist of supervisory, health and safety, technical, and QA/QC staff members to ensure safe and compliant progress of the remediation goals. Individuals of the project team each have specific responsibilities involving adherence with the statement of work (SOW), QAPP, health and safety plan (HASP), and FSP.

3.3 SUBCONTRACTOR ACTIVITIES

The selection of qualified subcontractors will be in accordance with Shaw E&I procurement and QA procedures. The bulk of the engineering work will be accomplished by Shaw E&I personnel, but a selection of environmental laboratories for LANTDIV work are procured and coordinated based on capacity and capability. Shaw E&I performs quality checks to determine that the subcontractors have fulfilled the procurement requirements necessary to perform site or off-site activities. All subcontractors will be required to follow the procedures of the SAP.

3.4 QUALIFICATIONS AND TRAINING OF PERSONNEL

Personnel assigned to the project, including field personnel and subcontractors, will be qualified to perform the tasks to which they are assigned. Said personnel will meet requirements set forth in OPNAVINST 5090.1B 25-5.8. This includes but is not limited to basic sampling techniques, field testing methodology, task-specific sampling methods, maintenance of environmental paperwork, and how to avoid cross contamination. In addition to education and experience, specific training may be required to qualify individuals to perform certain activities. Training will be documented appropriately and the forms placed in the project file as a record. Project personnel will receive an orientation to the full SAP and the HASP (under separate cover) as appropriate to their responsibilities before participation in project activities. Training of field personnel will be provided by the Site Supervisor, the QA Officer, or by a qualified designee.

4.0 SAMPLING PROCEDURES OVERVIEW

4.1 PURPOSE

The sampling events for this project may include, but are not limited, to the following:

- Soil Screening
- Off-site Borrow Sampling
- Post-excavation Confirmation Sampling
- Monitoring Well Sampling
- Soil Excavation sampling
- Groundwater Monitoring
- Disposal Characterization
- Excavation Field Sampling/Screening and Monitoring

Sampling procedures will be compliant with EPA, state, and applicable DOD specifications. This SAP meets or exceeds guidelines set forth by Naval Environmental compliance documentation OPNAVINST 5090.1B Chapter 25, NAVSEA T0300-AZ-PRO-010, and National Environmental Laboratory Accreditation Program (NELAP) quality system requirements. The matrix and required analytical will determine which sample collection procedure(s) is appropriate. Sections 5.0 through 9.0 provide specific techniques to be used when collecting soil/sediment, surface water, ground water, air, and/or waste samples. The remainder of Section 4.0 of this FSP addresses information that is consistent for any type of field sampling. An example sampling and analysis summary table is included in ***Appendix A***.

4.2 PREPARATIONS FOR FIELD SAMPLING

The Site Supervisor will oversee procurement of all required sampling equipment (***Table 4-1***). Where feasible, single-use disposable equipment will be used to minimize decontamination time and effort. For events requiring bailers and tubing, Teflon® and/or silicone will be used. Where metal equipment is to be used for soil sample collection and/or compositing, the augers, bowls, spoons, etc. will be made of stainless steel.

Field measurement instruments may be used for health and safety purposes or to determine matrix stabilization prior to sampling. These field instruments will be calibrated and maintained in accordance with the manufacturer's specifications. Documentation provided by the manufacturer for any field instruments will be filed on site for easy reference. Details regarding the field screening data procedures are available in Section 10.0 of this FSP.

The Site Supervisor will ensure that all permits and authorizations have been acquired prior to the start of remedial and monitoring activities at SJCA. The Project Chemist or appropriate representative will notify the chosen laboratory to provide EPA-approved sample bottles, preservative, and shipping containers. The laboratory may also be requested to provide deionized water for decontamination of equipment, prepared trip blanks, chains of custody, custody seals, and approved packing material to protect sample bottles during transit.

4.3 HEALTH AND SAFETY PROGRAM

A Health and Safety Officer will be assigned to oversee compliance of the remedial plans with OSHA regulations. This Health and Safety Officer may or may not be assigned solely to work at SJCA and may or may not handle tasks for all sites undergoing remediation or monitoring. The Health and Safety Officer(s) is responsible for writing and maintaining a Health and Safety Plan (HASP). He/she will ensure that the HASP is available to all site personnel prior to beginning work at SJCA. A sign-off form will be maintained with the site copy of the HASP to indicate that personnel have read the document and are aware of its implications.

4.4 SAMPLE CUSTODY AND DOCUMENTATION

Sample custody can be defined as physical possession of samples, having samples within visual range, or having samples located in a restricted access area. Sample possession during all sampling efforts must be traceable from the time of collection until the results are verified and reported. The sample custody procedures provide a mechanism for documentation of all information related to sample collection and handling. The primary piece of documentation to ensure sample custody is the Chain of Custody Form (COC). Shaw E&I personnel are responsible for providing evidence of sample custody from the time of collection until the laboratory receives the samples. The laboratory will be able to provide documentation of sample custody from that point to sample disposal.

As part of appropriate documentation, all sample bottles will be adequately labeled. The label will present sample identification and collection information. It will be pre-printed from the sample tracking system or completed with indelible ink. At a minimum, all sample labels will include the following sample information:

- Field sample location and unique sample identifier
- Project name and number
- Analysis requested for each bottle
- Method of preservation for each bottle

- Date and time of collection
- Initials of sample technician.

A sample numbering system will be utilized in the field to uniquely identify each sample collected at SJCA. The sample number will be traceable to the site, location, and depth (where applicable). The sample identification and description will be recorded by the Site Supervisor or representative in the sample collection logs. The samples collected on-site will be provided with a unique sample designation. The number will serve to identify the site, location, and specific sample identification number. The sample designation will be as follows:

SJXXX-NNN-DDD
Where:
SJ = St. Julians Creek Annex
XXX = Delivery Order for the project (085)
NNN = Sequential number starting at 001
DDDD = Specific indentifier
If sample is a field QC sample, the following designations will be added as a suffix

FB – Field Blank
RB – Equipment Rinsate Blank
(Duplicates must not be identified to the laboratory)

4.4.1 Field Custody Procedures

The sampling team with the Site Supervisor will maintain overall responsibility for the care and custody of the collected samples until they are transferred or properly dispatched to the fixed-base laboratory. All shipping or sample transfer activities will be documented.

Transfer of custody and shipping procedures will include:

- The Site Supervisor instructing sampling team personnel in the proper COC procedures before sampling begins,
- A COC entry made in the field for each sample. This document will accompany the samples in shipment, and a copy will be maintained at the site for placement in the project files at the conclusion of field activities. The custody of individual sample containers will be documented by recording each sample identification and the number of bottles on the appropriate COC form,

- COC records initiated in the field will be placed in a plastic bag and taped to the underside of the top of the shipping cooler used for sample transport,
- Each time responsibility for custody of the sample changes, the new custodian will sign and date the record,
- All coolers must be secured at the site with two custody seals prior to transport. Custody seals should be signed and dated by the person relinquishing custody of the samples being shipped. They should be placed over the opening of each cooler so that the cooler cannot be opened without breaking the seal.

4.4.2 Laboratory Custody Procedures

All samples to be analyzed by the fixed-base laboratory will be shipped via overnight courier service. Upon receipt, a representative of the laboratory shall check the integrity of the custody seals, then locate, sign, and date the COC. The laboratory is responsible for verifying that the COC and containers are in agreement. The COC, a Cooler Receipt Form, and information regarding any discrepancies between the COC and bottle labels will be faxed to the Project Chemist prior to preparation for analysis. The Laboratory Information Management System will provide evidence of sample custody from receipt by the laboratory until appropriate disposal.

4.5 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Samples must be placed in sample containers certified by the manufacturer to be pre-cleaned to EPA specifications. Containers provided by the fixed-base laboratory will be compatible with the matrix and intended analysis, and properly prepared and preserved to maintain sample integrity. ***Table 4-2*** specifies the types of containers needed for each analytical method and matrix.

Physical and chemical preservation includes techniques designed to stabilize the concentrations of analytes in the sample matrix during the time from sample collection through preparation and analysis. All samples shall be preserved by cooling to 4°C $\pm$ 2°C immediately after sample collection. Whenever possible, chemical preservatives will come prepared from the laboratory. The final pH of the chemically-preserved samples will be checked using pH paper and the result recorded. The pH paper will not be dipped into the sample container to measure pH, but an aliquot of sample shall be removed for pH testing and then properly disposed. If the pH check indicates pH adjustment is necessary, additional preservative will be added to attain the correct sample pH.

A sample holding time establishes the recommended maximum time that a sample may be held under preservation before extraction and analysis without compromising sample representativeness. Preservation techniques and holding times are standardized by the EPA according to analytical method. ***Table 4-2*** summarizes the latest information on preservation techniques and holding times for the requested analyses.

Chemical preservation is not usually recommended for solid matrix samples. Unpreserved samples that require preservation by the laboratory should be indicated on the sample label and should be flagged on the COC to identify these samples to the laboratory receiving personnel as requiring special handling.

4.6 SAMPLE PACKAGING AND SHIPMENT

Samples that are collected for off-site laboratory analysis that require overnight shipment will be generally prepared by:

- Sealing the container in an outer ziplock storage bag,
- Securely wrapping and taping each collected bottle in bubblewrap (or other similar shock-adsorbing material).

At least three sides of the container must be wrapped or surrounded with material when placing the samples into the shipping cooler. Adequate ice will be placed in doubled ziplock bags and added to the cooler around and over the top of the sample containers to form a cooling layer to help ensure proper preservation during shipment. In addition, most samples will have been pre-cooled to the desired temperature prior to packing for shipment. Completed and signed COCs will be placed into the cooler in a protective ziplock bag and taped to the underside of the cooler lid. A minimum of 2 custody seals will be applied across the opening of the cooler and the lid secured by wrapping the cooler with clear plastic packing tape. The cooler will then be ready for shipment according to the methods required by the overnight delivery service. At a minimum, the laboratory address, telephone number, and contact name should be included on the original airbill and, if multiple packages are sent, on each sample cooler.

At all times from the point of sample collection in the field through storage, inventory, preparation, and shipment, the samples must remain sealed, protected from sources of contamination, and adequately preserved by chilling.

As shipping regulations are subject to frequent updates without notification, the sample technician should, at least quarterly, petition a set of applicable shipping regulations from the overnight shipper to be assured of regulatory compliance.

4.7 DECONTAMINATION

All reusable equipment that may directly or indirectly contact samples shall be cleaned in a designated decontamination area. In addition, the contractor shall take care to prevent the sample from coming into contact with potentially contaminating substances, such as tape, oil, engine exhaust, corroded surfaces, or dirt. To minimize the possible contribution of even trace levels of contamination from sampling equipment, adequate decontamination must be completed prior to each use of the equipment. Sampling and drilling devices shall be scrubbed with a solution of potable water and Alconox®, or equivalent laboratory-grade detergent. The equipment will then be rinsed with copious quantities of potable water followed by a deionized (DI) water rinse. If equipment has come in contact with oil or grease, it will be rinsed with pesticide-grade methanol followed by pesticide-grade hexane. The equipment will be air-dried on a clean surface. If the sampling device shall not be used immediately after decontamination, it shall be wrapped in oil-free aluminum foil. Decontamination fluids shall be collected in appropriate storage containers. These will be sampled for characterization and disposal by an approved facility

TABLE 4-1
Equipment and Supplies Checklist
St. Julien's Creek Annex – Chesapeake, Virginia

Equipment	Required	Calibration	Comments
Materials			
Paper towels	✓		
Trash bags	✓		
Aluminum foil	✓		
De-ionized water	✓		
Alconox® detergent	✓		
Plastic sheet	✓		
Nylon rope	✓		
Teflon® bailers	✓		
Teflon® or silicone tubing	✓		
Cooler	✓		
Ice	✓		
Baggies	✓		
Bubble wrap	✓		
Stainless steel bowl	✓		
Forceps	✓		
1:1 HNO_3	✓		
Appropriate PPE	✓		PPE - personal protective equipment
Instruments			
Water level indicator	✓		
Dual interface probe	✓		
PID or FID	✓	✓	PID - photoionization detector FID - flame ionization detector
Peristaltic pump	✓		
Flow-through cell meter:	✓	✓	DO - dissolved
- pH, temp, turbidity, DO, and conductivity			Oxygen
PAH field test kits	✓	✓	
XRF field portable x-ray fluorescence spectrometry	✓	✓	

TABLE 4-2
Sample Containers, Preservation, and Holding Times
St. Julien's Creek Annex – Chesapeake, Virginia

Analysis	Matrix	Containers	Preservation	Holding Times
Alkalinity	Water	250 ml HDPE	Cool to 4°C	14 days
Conductivity	Water	250 ml HDPE	Cool to 4°C	28 days
Cyanide	Water	250 ml HDPE	NaOH to pH > 12, Cool to 4°C	14 days
Dissolved Oxygen	Water	250 ml HDPE	None	Immediate
Hardness	Water	250 ml HDPE	Cool to 4°C	180 days
ICP Metals	Water	250 ml HDPE	HNO_3 to pH < 2, Cool to 4°C	180 days
	Solid	4 oz jar	Cool to 4°C	180 days
Mercury	Water	250 ml glass jar	HNO_3 to pH < 2, Cool to 4°C	28 days
	Solid	4 oz glass jar	Cool to 4°C	28 days
Nitrogen Compounds	Water	250 ml HDPE	Cool to 4°C	48 hours
pH	Water	250 ml HDPE	None	Immediate
	Solid	4 oz jar	None	Immediate
TDS	Water	250 ml HDPE	Cool to 4°C	7 days
TSS	Water	250 ml HDPE	Cool to 4°C	7 days

TABLE 4-2 (continued)
Sample Containers, Preservation, and Holding Times
St. Julien's Creek Annex – Chesapeake, Virginia

Analysis	Matrix	Containers	Preservation	Holding Times
TPH	Water	1 L Amber jar	H_2SO_4 to pH < 2, Cool to 4°C	7 days extraction 40 days analysis
	Solid	8 oz jar	Cool to 4°C	14 days extraction 40 days analysis
Temperature	Water	250 ml HDPE	None	Immediate
Total Organic Carbon	Water	250 ml opaque glass or plastic jar	H_2SO_4 to pH < 2, Cool to 4°C	28 days
Turbidity	Water	250 ml HDPE	Cool to 4°C	48 hours
Semi-volatiles	Water	1 L Amber jar	Cool to 4°C	7 days extraction 40 days analysis
	Solid	8 oz jar	Cool to 4°C	14 days extraction 40 days analysis
Volatiles	Water	3 x 40 ml vials	HCL to pH < 2, Cool to 4°C	14 days
	Solid	3 x EnCore® samplers 4 oz glass jar	Freeze to -10°C or sodium bisulfate solution within 48 hours	14 days
	Air	SUMMA canister	None	14 days
TCLP	Solid	3 x 8 oz jar	Cool to 4°C	14 days leaching

5.0 SOIL/SEDIMENT SAMPLING

5.1 PURPOSE

This section identifies the steps and technical areas that will be encountered in conducting a soil/sediment sampling program. The role of a sampling run is identified along with procedures that will guide the sample technician in conducting a compliant program. This sampling program does not address site cleanup or investigation, which should be sought in the task-specific SAP.

5.2 GENERAL SAMPLING PROCEDURES

The characterization of soil/sediment contamination requires that samples be collected from identifiable locations and that samples received by the laboratory represent actual soil conditions. The lithology (presence and location of different types of soil, bedrock, and groundwater) and depth or extent of contamination should be determined if possible prior to sampling. All sampling events should be well planned and coordinated with the Project Manager, the Site Supervisor, and the Project Chemist as required by the task-specific SAP. All target analyte lists should be reviewed with both the laboratory that will perform the analysis and the sample technician(s).

Sampling personnel are critically important to sampling program success, since the sample technician is often in the best position to detect areas of suspicion. Even sophisticated sampling procedures should not be relied upon to replace good judgment and common sense on the part of sampling personnel in discerning the difference between routine and extreme case scenarios. Sampling personnel must be alert to unusual conditions in their surroundings such as dead animal or plant life, odors not normally associated with an area, and changes in the visual appearance of the location to be sampled.

Soil/sediment samples will be collected using a stainless steel trowel, a split-spoon sampler, or hand auger. Borings advanced for subsurface soil samples greater than 1-foot depth will be collected using steel hand augers, direct-push sampling probes, or drilling rig as applicable. All soil/sediment sampling equipment that may come into contact with samples or sampling surfaces will be constructed of stainless steel, borosilicate glass, or Teflon®. All equipment used for collection, transfer, and homogenization will be properly decontaminated before collecting samples and between sampling locations.

After the sample is collected, the soil/sediment will be homogenized as thoroughly as possible in a stainless-steel bowl. Samples collected for chemical analysis will be placed in the appropriate sample containers, labeled with proper identification, and packed in a cooler with ice pending shipment to the laboratory. To maintain integrity, samples collected in the field must be placed in a dedicated sample ice chest, on ice, and chilled to 4ºC ± 2ºC from the time of collection until receipt by the laboratory for analysis

5.3 VOLATILE SAMPLE COLLECTION

For volatile sample collection all soil samples will be visually classified and documented on a sample collection log. The method chosen to ensure representativeness, such as grid sampling, grab sampling, or boring will depend on the task-specific SAP. Whenever possible the sample technician should attempt to determine the approximate concentration of the soil or material to be sampled. This determination may be made by process knowledge, use of field sampling equipment such as an organic vapor monitor (OVM), or appearance. The sample technician should not attempt to classify the sample by smelling or other means of physical contact. The appropriate sample method will fall into one of three categories: low-level volatile organic samples (those samples containing <200ug/kg target analytes), mid- and high-level volatile organic samples (those samples containing ≥200ug/kg target analytes), or oily soil/sludge samples.

5.3.1 Low-level Volatile Samples

Low-level are samples that the sample technician suspects to be clean or contaminated at a level <200ug/kg due to process knowledge, appearance, site history, or other method. These samples will be collected as follows:

Whenever possible equipment shall be disposable and certified laboratory clean. Otherwise it shall be decontaminated in accordance with section 4.7 of this document. A sample method will be chosen by the Project Manager, Site Supervisor, or Project Chemist that will best maintain the representativeness of the samples to be taken. The samples will then be collected using the Encore® sampler. Three Encore® samples will be taken per sample location, as well as a sample aliquot collected in an unpreserved clean 4 oz. glass jar to provide the laboratory with sample for a dry weight calculation. Immediately after collection, samples should be stored in a cooler at 4°C ± 2°C. All sample custody, documentation, and shipping procedures per section 4.0 of this FSP should be followed. SW-846 method 5035 states that samples collected with the Encore®sampler must be analyzed or preserved within 48 hours of collection. Therefore, notification of the laboratory to analyze the samples is crucial. Proper selection of a time frame within which to collect the samples and still meet overnight shipping requirements is also crucial. The actual samples are obtained in the following manner:

After all previous preparations have been made, the sample technician dons clean sampling gloves. The reusable Encore® package is then opened, and the core device and cap are removed. The core device is placed into the T-handle with the plunger pulled back. The T-handle containing the core device is then pushed into the soil to be sampled, packing the soil into the sampler. The device is then removed from the soil and residue from the sides is brushed off. The cap is placed onto the core device. (Extreme care should be taken at this stage of the operation, as it is easy to break the plastic retaining ears off of the cap). The sample is then labeled and resealed into the original package.

All sample documentation and chain of custody procedures outlined in Section 4.4 should be followed. After proper documentation has been performed, sample packaging and shipping as outlined in Section 4.6 of this document should be completed. Upon receipt by the laboratory, low-level volatile samples shall be preserved with sodium bisulfate or freezing to -10°C.

5.3.2 Mid- and High-Level or Oily Soil Volatile Samples

These samples should be collected by whatever means is specified in the task-specific SAP. Options may include borings, grab, or auger. The samples should be collected in 4 oz.glass jars with zero headspace. It is critical that headspace be minimized to prevent loss of volatile target analytes. Jar should then be labeled and stored at 4°C.

All sample documentation and chain of custody procedures outlined in Section 4.4 should be followed. After proper documentation has been performed, sample packaging and shipping as outlined in Section 4.6 of this document should be completed.

5.4 NON-VOLATILE SAMPLE COLLECTION

All soil samples will be visually classified and documented on a sample collection log. The Site Supervisor will choose the method for sampling, such as split-spoon sampler or auger, based on the task-specific SAP. The following procedure is applicable to both discreet samples and sub-samples to be combined for compositing.

Unless their collection is specifically required by the task-specific SAP, remove all extraneous rocks, twigs, gravel, and leaves from the soil. Don a fresh pair of sample gloves and then place sample, or subsamples to be composited into a stainless steel bowl. The sample is then thoroughly homogenized using a stainless steel spoon. If the sample aliquot is to large to reasonably homogenize in the stainless steel bowl, the sample should be carefully divided into quarters and then each of these quarters further divided into quarters. One of each of the second set of quarters is then recombined into the mixing bowl and then homogenized. The sample is then placed into an 8 oz. jar, taking care to minimize headspace as much as possible, and then labeled and stored in a cooler at 4°C.

All sample documentation and chain of custody procedures outlined in Section 4.4 should then be followed. After proper documentation has been performed, sample packaging and shipping as outlined in Section 4.6 of this document should be completed.

6.0 SURFACE WATER SAMPLING

6.1 PURPOSE

This section describes the activities involved in surface water sample collection. Surface water samples are collected to characterize surface water quality and/or to determine pollutant concentrations. Events that fall under this type of sampling include site surface water runoff areas, surface seepage of leachate, and National Pollutant Discharge Elimination System (NPDES) permitted discharge to waterways.

6.2 GENERAL SAMPLING PROCEDURES

Surface water samples are collected to determine whether discharge from the site has a significant impact on the surface water body. A preliminary surface water quality survey should measure pH, temperature, conductivity, and dissolved oxygen at points along shorelines, wetlands, creeks, and ponds. Sampling should be based on visual evidence of seepage or discharge streams. Sampling points should be established at locations where significant changes occur in the aforementioned field tests indicating the presence of contamination or discharge. Actual sampling situations encountered in the field may vary to best fit each situation. The most important goal of surface water sampling is to collect the sample most representative of all of the horizons or phases present in the liquid.

Prior to sampling, all field test equipment should be thoroughly decontaminated per Section 4.7 of this document. All probes should be rinsed with ASTM type II water, or equivalent. All sampling locations should be approached from downstream to avoid disturbing any sediments which might become entrapped in the sample. It should be noted that much helpful preliminary data can be obtained from sources such as United States Geological Survey (USGS) or the Soil Conservation Survey (SCS) prior to sampling. At a minimum the following information should be recorded in the field logbook:

- Equipment calibration data
- Sample location, ID number, date, and water temperature at time of collection
- Dissolved oxygen, pH, conductivity, and depth of water at sample location
- Water depth at midpoint (if applicable)
- Description of flow rate, velocity, weather conditions at time of sampling, and physical characteristics of the sample.

6.3 SURFACE WATER SAMPLING

The simplest method of sampling surface waters is to don a pair of new sample gloves and immerse the sampling bottle midstream and at mid-depth where practical. The sample bottle must be certified clean from the laboratory, and handling of the bottle must be minimized to avoid possible contamination. Samples for parameters which must be chemically-preserved cannot be sampled in this manner. Also depending on the size of the body of water or its depth this sampling method may not be possible. The task-specific SAP will outline the sampling device, such as Bacon Bomb, pond sampler, or weighted bottle, to be used for the sampling event. Task-specific SAPs will also outline the necessity of boats or other water transportation methods, which may be needed in order to reach the area to be sampled. For sample analyses requiring chemical preservation, some initial collection device must be utilized and then the sample is carefully poured into the preserved bottle. All sample bottles must be certified laboratory clean. A representative sample for water quality testing will be collected at each surface water sampling location. The following procedures generally describe standard surface water sampling events: (The task-specific SAP must be consulted prior to the sample event).

- All equipment will be decontaminated and will be protected from contact with foreign materials and contamination through use of clean plastic sheeting.
- Grab samples will be collected using a Teflon®, glass, or stainless-steel sampling device. Where pond samples are being collected, the mouth of the sample collection device will be maintained completely under water, when possible. (Note that chemical preservatives will not be added until the sample aliquots for analysis are transferred from the collection vessel to the sample collection jars.)
- Sample handling requirements will be generally the same as for ground water samples.
- At the time of sampling, after collection of the sample for chemical analysis, a second sample will be collected, analyzed for water quality parameters, and the field data recorded.
- Sample containers will be completely filled with water, preserved chemically (if required), wiped clean and dry, affixed with a pre-printed label, and stored for shipment. Identifying information will include the sample location, date, time, sample technician's initials, added chemical preservatives, and required analyses.
- All sample containers will be transferred to an ice chest, kept on ice at 4°C ± 2°C, and delivered to the laboratory in a timely manner. For general chemistry analysis, the samples must be delivered to the laboratory within 24 hours to avoid exceeding the holding time. Otherwise, all other samples must be shipped from the field within 48 hours of collection.
- Samples submitted for metals analysis will not be filtered in the field. Criteria and methods for filtering samples, if required, will be in accordance with the procedure outlined for ground water.

All sample documentation and chain of custody procedures outlined in Section 4.4 should then be followed. After proper documentation has been performed, sample packaging and shipping as outlined in Section 4.6 of this document should be completed.

7.0 GROUND WATER SAMPLING

7.1 PURPOSE

This section describes the activities involved in ground water sample collection. Procedures are described in this section for proper well purging techniques and for obtaining a representative sample from a ground water monitoring well. There are four monitoring wells in the vicinity of Site 3 designated SJS3-MW04S, SJS3-MW06S, SJS3-MW02S and SJS3-MW02D.

7.2 GENERAL SAMPLING PROCEDURES

The single most important part of sampling monitoring wells is obtaining a representative sample of the ground water where the well has been screened. Therefore, evacuation of the water column in a monitoring well is required prior to sample collection. This removes the standing water column and induces ground water flow from the surrounding formation into the well. The exception to this standard procedure is if the objective of the sampling event is to determine the presence of non-aqueous phase liquids or free standing product in the well. Access to monitoring wells may be difficult and the wells themselves hard to locate in the field. The sample technician must obtain information on the location, access, and permission required before visiting the site. Monitoring wells usually have a friction or screw cap and should be locked. Keys to unlock the caps and a complete set of tools are necessary before beginning a sampling event on monitoring wells.

If several wells are to be sampled, proper identification of the well is essential. The well permit or ID number should be known prior to the sampling event. If the well number is not known, a precise field description of each well location is needed to avoid confusion of reporting. Where sufficient history is available, sample the wells in the order of least contaminated to most contaminated to avoid cross contamination of the samples. If previous data is not available on the wells, the well headspace may be sampled with a photoionization or flame ionization detector (PID or FID) to determine the order of sampling.

Equipment used to sample monitoring wells generally fall into two categories: (a) that used to evacuate water in the well casing, and (b) that used to collect a discrete sample for analysis. However, in some instances the device used for evacuation may be the same as that used for sample collection. A large number of wells at SJCA have dedicated Teflon® bailers, which fall into the latter category. The individual performing sampling should consult the task- specific SAP to ascertain the proper well evacuation device. In addition to sampling for standard monitoring well parameters, the ground water at SJCA is frequently sampled for natural attenuation parameters. The sample technician should check the task-specific SAP to ascertain if these parameters are applicable.

7.3 MONITORING WELL PURGING PROCEDURES

The first step in sampling monitoring wells is to measure the standing water column in the well. This is done via the dual interface probe. The dual interface probe is capable of obtaining readings for both aqueous and non-aqueous liquids. To avoid problems due to interference, the aqueous phase is always measured first. The non-aqueous phase is then measured and both measurements are recorded into the logbook. Any value measured for the non-aqueous phase implies free standing product. Wells with free standing product are not generally sampled at SJCA.

The task-specific SAP should be consulted in cases where free standing product is encountered to determine the need for sampling. Once the measurements have been taken and recorded to the nearest 0.01 feet, the standing water column volume can then be calculated. All wells should be gauged prior to any purging or sampling to avoid cross contamination and to determine if any wells are damaged or may pose a problem in sampling. After the wells have been gauged, the well volume can be calculated by the following formula: the amount of water within the well casing is calculated by multiplying the linear feet of water by the volume per foot for the proper diameter casing. The capacity of common casing diameters are shown below:

Casing Diameter (ft.)	Gallons/Linear foot
2 inch (0.1667)	0.1632
4 inch (0.3333)	0.6528
6 inch (0.5000)	1.4688
8 inch (0.6667)	2.6112
10 inch (0.8333)	4.0800
12 inch (1.0000)	5.8752

Example:

Total depth of well casing	100 ft.
Depth to water	-20 ft.
Linear feet of water	80 ft.
2 inch casing	x 0.1632
Amount of water in casing	13 gal.

An alternate formula that can be used to determine the gallons in any diameter well is:
Number of gallons = **5.8752 x C^2 x H**
Where C = casing diameter in feet and H = height of water column in feet.

The amount of water in the well should then be multiplied by three to determine the minimum volume to be purged from the well prior to sampling.

Typically three volumes of water are purged initially from a well, then readings for pH, conductivity, turbidity, and temperature are taken. Small amounts of water are then purged until readings from these field parameters are stable. Stabilization will be achieved when pH measurements remain within 0.1 standard units, specific conductance varies no more than 10 percent, and temperatures and turbidity are constant for at least three consecutive readings. If the readings do not stabilize, purging is continued until five well volumes have been reached. At this point if readings are not stable, then purging is discontinued and sampling is begun. No more than five well volumes are to be purged. Exact volumes purged and all stability data should be recorded in the logbook.

Actual purging of the well will be accomplished using either a low-flow Grundfus, or similar pump, or the aforementioned dedicated Teflon® bailers. The sample technician should consult the task-specific SAP for the device to be used in a well purging event. Every effort must be made when using these devices to not over-pump the well. Fast pump rates can cause hydraulic turbulence in the well, which would effect the representativeness of the sample.

Typically, pump rates should not exceed those used to develop the well. Well placement logs can be consulted to obtain these rates. Care should also be taken not to evacuate the well to dryness while purging. This implies that a three to five times purging volume may be impossible for some wells. If a well has been pumped to near dryness at a flow rate of less than 0.5 gallons per minute, the well should be allowed a minimum twenty minute recovery time and then sampled. If recovery time exceeds 24 hours, then project management should be notified and corrective action taken.

Sampling should be performed within two hours of purging the well; however, due to recharge rates, this is not always possible. All sampling must be performed within 24 hours of well purging. If this cannot be accomplished, the Project Manager should be notified immediately, and corrective action should be taken. A newly installed well should not be sampled for at least two weeks after development unless otherwise specified by the Project Manager due to normally slow flow rates of the groundwater at SJCA.

7.3.1 Before Purging

The following items should be performed and entered into a logbook before monitoring well purging:

- Record date, time, and weather conditions
- Document well number and permit number
- Screen PID or FID reading taken from the headspace immediately after the cap is removed. (If readings exceed background, safety precautions outlined in the HASP will be followed)
- Check for free product, measure thickness if present
- Measure initial pH, dissolved oxygen, temperature, specific conductivity, and turbidity (parameters may be task-specific)
- Gauge total depth from top of inner casing or surveyor's mark
- Record depth from top of inner casing to water
- Calculate volume of water present in the well.

7.3.2 After Purging

Record the following after purging information:

- Start and end time of purging
- Purge method
- Purge rate(s)
- Total volume purged and calculations for said volume
- Interim and final pH, dissolved oxygen, temperature, specific conductivity, and turbidity (parameters may be task-specific)
- Start and end time of sampling
- Sampling method

7.4 MONITORING WELL SAMPLING

After purging, sampling of a well should take place as soon as possible. Whenever possible, sampling should take place in the order of least contaminated well to highest contaminated well. All sampling and purging equipment will be decontaminated before use and before each successive use in accordance with the prescribed decontamination procedures. Collection of ground water samples will be documented on a sampling log.

The equipment required for ground water sampling includes a water level indicator, low-flow submersible pump with Teflon®-lined tubing, disposable Teflon® bailers of appropriate size for the monitoring wells, nylon rope (Note: Rope will not be allowed to touch the ground and will not be reused between wells), meters for detecting field parameters (pH, turbidity, conductivity, etc.), appropriate sample bottles and temperature control cooler, plastic sheeting, and flame ionization detector (FID) or photoionization detector (PID). All equipment used to purge wells and collect samples will be protected from ground surface contact and contamination by use of clean plastic sheeting.

Due to low recharge rates, a large number of wells to be sampled at SJCA have dedicated bailers. Where recharge rates allow, a grundfus or other type of in-line sampling pump will be used. Each well should have dedicated Teflon® tubing and the pump should be meticulously decontaminated between wells. An equipment blank taken periodically between samples will verify that decontamination procedures are sufficient. Where dedicated tubing and equipment blanks are not used, a disposable bottom-filling Teflon® bailer with new polypropylene rope shall be used. Disposable bailers will not be reused. The cleanliness of new disposable bailers will be ensured in one of two ways: either certificates of cleanliness will be obtained from the manufacturer, or rinsates will be collected from new disposable bailer lots to verify they are provided in a pre-cleaned condition.

Volatile organic parameters are sampled first. Ideally the first bailer or aliquot from the in-line pump, before any other fraction is sampled, will be used when volatiles analysis is required. Care should be given, as in all volatile parameter sampling, that no air is entrained into the VOA vial. Vials should be checked for bubbles, and if any are present a new VOA vial will be used for recollected sample. Any short holding time parameters, such as nitrate, will be sampled next. Semi-volatile and metals parameters will be sampled last. Task-specific SAPs should be consulted for sampling methods and any on-site parameters to be tested.

Sample containers will be labeled with appropriate identifying information (location, date, time, condition, added preservatives, etc.). Pre-printed labels will be provided by the Site Supervisor or labels shall be filled out with indelible ink. Each sample will be logged in a field notebook at the time of collection. Sample containers of appropriate volume and composition will be provided by the laboratory in advance to ensure the collection of sufficient volumes for all specified analyses.

In general, samples for metals analysis shall not be filtered. Instead, analyses shall be performed on unfiltered samples and the results obtained will be representative of the total metals concentration present in the groundwater. If there is a site-specific need for filtering samples and reporting dissolved metals, filtering will not be performed in the field due to the increased likelihood of sample contamination. Any necessary filtering will be conducted in the laboratory as soon as possible after sample receipt. Total metals samples will be pre-preserved with HNO_3 to a pH less than 2. Dissolved metals samples will be preserved by the laboratory after filtering.

All sample containers will be transferred to a cooler (kept at 4°C ± 2°C). All sample documentation and chain of custody procedures outlined in Section 4.4 should then be followed. After proper documentation has been performed, sample packaging and shipping as outlined in Section 4.6 of this document should be completed. Proper laboratory notification and planning must be taken so that parameters with short holding time requirements are not missed.

8.0 AIR SAMPLING

8.1 PURPOSE

This section provides supporting background information and general procedures for air sampling. Because air sampling methods are often very complex, this section will provide only a general overview of air sampling methods. The most common methods used at SJCA will be provided for in their entirety, but the task-specific SAP should be consulted for methodology not listed in this section.

8.2 GENERAL SAMPLING PROCEDURES

Air sampling at the SJCA generally falls into two basic types: (a) ambient air (either monitored for background and preliminary reasons), or (b) discharges (measured from direct sources, such as those at Soil Vapor Extraction (SVE) systems). The ambient air may be monitored for health and safety related issues, such as those used for determination of levels of personal protective equipment (PPE) requirements, or for initial readings used in a sample event, such as headspace readings taken prior to groundwater monitoring well sampling. These readings are generally accomplished via a portable sampling device such as a flame ionization detector (FID) or a photoionization detector (PID). Sampling of discharge sources is generally accomplished through collection of a discreet sample through a sampling device such as a Tedlar bag or SUMMA canister and subsequent analysis is performed by an off-site laboratory.

8.3 AMBIENT AIR SAMPLING

Before ambient air sampling is performed, considerations as to the sensitivity of the device to be used in relation to the compounds of interest must be considered. In the case of a PID not all compounds of interest can be measured with the same electron-volt intensity lamp. The task-specific SAP should be consulted to verify that the proper lamp is being used. If an FID is being used, safety also becomes a prime consideration, as the device operates through use of a hydrogen flame and should not be used in enclosed areas with very high concentrations of volatile compounds.

The hand-held instrument should be calibrated with the appropriate calibration gas prior to use, and results of that calibration should be recorded in the calibration log. All manufacturer's instructions should be followed in the calibration of the instrument. The instrument must be left on after calibration and not turned off until all readings have been taken. Ambient samples are then read either directly or collected in a Tedlar bag using a vacuum box. If any readings are more than 10% outside of the calibration range, the instrument should be recalibrated using a higher reference standard, or the sample should be diluted by mixing equal volumes of sample and certified “zero” air in a Tedlar bag.

After reading of samples is performed, the following information should be recorded in the logbook:

- Date and time of sampling
- Sample location and map (if possible)
- Ambient weather conditions (temperature, humidity, wind speed and direction) and cloud conditions
- Instrument used and serial number for instrument
- Calibration data, such as actual calibration reading and type calibration gas used. The concentration of the calibration gas should also be noted
- Any anomalies that may have occurred such as a flame out on the FID or lamp that fails to ignite on the PID. (Note if either of the two previous conditions occur, instrument is to be re-calibrated immediately)
- Value for reading of each sample including any dilution calculations.

8.4 DISCHARGE SOURCE AIR SAMPLING

To collect a discreet sample, a Tedlar bag or SUMMA canister is used. In the case of the Tedlar bag, the sample is collected from the appropriate location specified in the task-specific SAP using a vacuum box for areas where the pressure is less than ambient or directly collected from areas where pressure is greater than ambient. An unused Tedlar bag is used. The bag is then immediately placed in a cooler kept at 4°C ± 2°C. After proper documentation has been recorded, sample packaging and shipping as outlined in Section 4.6 of this document should be completed.

The SUMMA canister is shipped pre-cleaned and certified from the laboratory. It has been voided to a preset vacuum and only needs to be opened to introduce the sample. SUMMA canisters do not require refrigeration. After the sample is taken, all sample documentation and chain of custody procedures outlined in Section 4.4 should then be followed.

9.0 WASTE SAMPLING

9.1 PURPOSE

This section describes the activities involved in sampling liquid wastes, unknown contents of drums or cylinders, solid wastes, or other hazardous materials which may pose a threat to human health and the environment.

9.2 GENERAL SAMPLING PROCEDURES

Many of the wastes encountered can be sampled using methodologies from other sections of this document. Liquids which are aqueous can be sampled using the methods found in Section 6.0. Solids may be sampled using methods from Section 5.0. There are a number of wastes which require special methods in their sampling or may require special sampling methods due to the manner by which they are contained. Also certain wastes have specific regulatory guidelines which must be met in their sampling. Task-specific SAPs should be consulted prior to any testing to ensure compliance. Wastes which fall outside of the sampling methods outlined in this document will be dealt with separately.

9.3 DRUM OR CONTAINER SAMPLING

Prior to sampling drums the foremost concern is safety. Drums can contain highly toxic materials and can be under extreme pressure. The Safety Officer should be consulted before any drum sampling events. After safety concerns have been met, the drum to be sampled should be thoroughly inspected for leaks or bulging which may require attention before proceeding with sampling. If at all possible, the sample technician should try to ascertain what the drum contains before sampling. Extreme caution should be used in any drum sampling event, even if the contents are known. All drums should be handled with a minimum level B PPE. Non-sparking tools should always be used in drum sampling. The opening of drums provides considerable risk, if not done with the proper technique. Drums should be staged in an area of easy access prior to sampling. Any standing water must be removed from the top of the drum. Bungs should be removed slowly from drums to avoid sudden pressure releases and the sample technician should pay attention to any sounds the drum makes as the bung is being loosened. If escaping air or gas is heard, then drum should be left standing until escaping air is no longer heard. Drums that require sampling for characterization rarely hold homogeneous liquids. Therefore, it is important to select a method of sampling which can collect all phases present in the drum. A disposable COLIWASA (Composite Liquid Waste Sampler) will therefore be used.

Sampling is accomplished by removing the bung and inserting the COLWIWASA, with the stopper remover, all the way into the drum. Sufficient time is allowed to pass to let more viscous liquids enter the tube, and then the stopper is pulled into the tube. The tube is removed from the drum taking care that outside contents sticking to the drum are not allowed to spill on surrounding areas. Contents are then carefully poured into an appropriate sample vessel: VOA vial for volatile analysis, 4 or 8 ounce jars for semi-volatile or metals parameters. After the sample containers have been sealed, the following information is recorded in the logbook:

- Type of drum or container
- Total capacity of drum or container
- Markings on drum exterior
- Information from labels on the drum
- Color of drum contents
- Origin (if known)
- Condition of drum
- Location prior to being staged and map (if possible.

9.4 PCB SAMPLING

Sampling for PCBs in soils should be carried out by the methodology described in Section 5.0 of this document. Sampling for PCBs in aqueous liquids should be carried out by methodology specified in Section 6.0 of this document. Sampling of oils or transformers for PCB waste should be carried out in the following manner:

Proper protection must be worn when sampling PCB-containing materials. Spill prevention and control must be planned in advance. Plastic sheeting and absorbent material must be on hand. Transformers are often in difficult to reach locations, so that proper planning is crucial before the sampling event. A transformer must be certified off-line and de-energized by an electrician or competent person before sampling. Lockout/tag-out procedures should be in place. The transformer must be depressurized as well. Sampling of the transformer is then carried out using a COLIWASA per the previous section on sampling drums

9.5 WIPE SAMPLING

To collect a wipe sample the following equipment is needed:

- Ruler or measuring tape to measure areas to be sampled
- Disposable gloves to be changed between each sample
- Sterile gauze to be used for sampling (already placed in individual sample container)
- Appropriate solvent such as methanol. Should be laboratory grade or better.

The use of three inch by three inch gauze is preferred for ease of sampling. It is advisable to use a 25 cm x 25 cm area to make calculations easier at the end of the event. This is not always possible and sometimes different areas will be used. Wipes are sampled in the following fashion:

- Don a new pair of sampling gloves
- Remove gauze from sample jar
- Soak in small portion of methanol
- Wipe area to be sampled once in vertical direction and once in horizontal direction
- Wipe entire area so that sample is picked up. Use moderate pressure
- Replace gauze in the sample container.

Following the previous sections, samples are then transferred to an ice chest, kept on ice at 4°C ± 2°C. All sample documentation and chain of custody procedures outlined in Section 4.4 should then be followed. After proper documentation has been performed, sample packaging and shipping as outlined in Section 4.6 of this document should be completed.

10.0 FIELD PARAMETERS

10.1 PURPOSE

The purpose of this section is to establish criteria for field sampling methodologies. As a large number of field sampling parameters are used at the SJCA, the task-specific SAP should be consulted as to which parameters apply. Field testing falls into two primary categories, (a) instrumentation used to obtain a direct readout of specific parameters, and (b) chemical test methods using chemical reactions to provide quantitative data. The number of such methods is so broad it is impossible to describe their procedures in a single document. Therefore, this section will describe general procedures which have wide applications in these methodologies.

10.2 GENERAL SAMPLING PROCEDURES

Field equipment calibration will follow the protocols described by the equipment manufacturer, including calibration criteria and frequencies.

Field testing and monitoring equipment will be inspected and calibrated before use. Testing and monitoring equipment includes PIDs and FIDs for monitoring soil vapor, HACH kits for specific ions, and flow-through cell meters for pH, temperature, specific conductivity, dissolved oxygen meters, and turbidity. Standards for these instruments will be kept on site and in good condition. Each day that an instrument is used, its calibration will be checked against standards. If an instrument is out of calibration, it will be recalibrated prior to use. Calibrated equipment will be identified using the manufacturer serial number or other unique identification.

Equipment that fails calibration or becomes inoperable during use will be removed from service and separated from serviceable equipment to prevent inadvertent use. Such equipment will be repaired and recalibrated or replaced, as appropriate. No equipment that has failed calibration will be used until the equipment has been repaired.

All equipment to be used during the field sampling will be examined to certify that it is in operating condition. This examination includes checking the manufacturer operating manuals and the instructions with each instrument to ensure that all maintenance items are being observed. Field notes from previous sampling trips will be reviewed to ensure that any prior equipment problems have been remedied.

All chemical test methods or kits should be inspected for damage prior to use. Each of these tests or kits often has an expiration date, which should be checked as well. No kit or method will be used that is past its expiration date under any circumstance. Methodology should be read and understood before it is actually used in the field. It is often prudent to perform “dry runs” inside before attempting the test in the field.

All data from chemical and instrumental methods should be recorded in the logbook, including calibration information as per Section 4.3 of the QAPP, all dilution and extraction data, weights of samples, and ambient air conditions.

11.0 FIELD SCREENING WITH X-RAY FLUORESCENCE SPECTROMETRY

11.1 PURPOSE

The purpose of this section is to establish criteria for field sampling methodologies utilizing field portable X-ray Fluorescence Spectrometry (XRF). As a large number of field sampling parameters are used at the SJCA, the task-specific SAP should be consulted as to which parameters apply.

11.2 GENERAL SAMPLING PROCEDURE

Field equipment calibration will follow the protocols described by the equipment manufacturer, including calibration criteria and frequencies. Field testing and monitoring equipment will be inspected and calibrated before use. Standards for these instruments will be kept on site and in good condition. Each day that an instrument is used, its calibration will be checked against standards. If an instrument is out of calibration, it will be recalibrated prior to use. Calibrated equipment will be identified using the manufacturer serial number or other unique identification.

Equipment that fails calibration or becomes inoperable during use will be removed from service and separated from serviceable equipment to prevent inadvertent use. Such equipment will be repaired and recalibrated or replaced, as appropriate. No equipment that has failed calibration will be used until the equipment has been repaired.

All equipment to be used during the field sampling will be examined to certify that it is in operating condition. This examination includes checking the manufacturer operating manuals and the instructions with each instrument to ensure that all maintenance items are being observed. Field notes from previous sampling trips will be reviewed to ensure that any prior equipment problems have been remedied.

11.3 XRF SAMPLING PROCEDURE

The field-portable x-ray fluorescence spectrometry (XRF) will be used for the determination of elemental concentrations of metals in the soil and sediments. The XRF screening for metals shall include TAL metals: copper, iron, lead, vanadium and zinc. Concentrations shall be measured as mg of metal per kg of soil/sediment sample. XRF field screening at Site 3 only will be conducted in accordance with EPA Method 6200, Field Portable X-Ray Fluroescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. The field portable X-Ray Fluorence (FPXRF) technology uses a sealed radioisotope source to irradiate samples with x-rays that results in the rearrangement of electrons for identification of metal concentrations.

Field samples for measurement of iron, lead, zinc, copper and vanadium concentrations can be insitu or retained in plastic sample cups. Samples may be analyzed insitu in about one minute down to a concentration of approximately 40 ppm. The instrument (Niton Model 702 XRF) has detection limitations for iron, lead, zinc, copper and vanadium as listed below.

Analyte	**Detection Limit in Quartz Sand As Publish in Niton 702 Manual (mg/kg)**
Iron	60
Lead	20
Zinc	50
Copper	50
Vanadium	50

In addition to point measurement samples may be composited over an area prior to taking a reading to better approximate the average concentration in a given area. A quantity of 3 to 5 grams of soil is required to perform the x-situ test, however, only about 0.3 grams of the typical XRF soil sample (approximately 1 mm depth in a 25 mm diameter XRF sampling cup) produce the major part of the instrument response. Minimal sample preparation is needed to obtain XRF measurements. These include drying (samples should be relatively dry due to minimum depth of excavation) passing 2 mm sieve, and mixing. Equipment used to mix samples will be decontaminated between sample locations, and new plastic cups will be used for each reading.

An indeterminate number of field sample are to be run and subsequent data collected. The data will be tabulated and reported for use by the Navy in documenting site conditions and assisting in judging of limits of excavation as the excavation progresses in real time. This information in collaboration with the confirmation samples will be used for site documentation.

12.0 FIELD SCREENING WITH POLYCYCLIC AROMATIC HYDROCARBON

12.1 PURPOSE

The purpose of this section is to establish criteria for field sampling methodologies utilizing the Polycyclic Aromatic Hydrocarbon (PAH) test kits. As a large number of field sampling parameters are used at the SJCA, the task-specific SAP should be consulted as to which parameters apply.

12.2 GENERAL SAMPLING PROCEDURE

Field equipment calibration will follow the protocols described by the equipment manufacturer, including calibration criteria and frequencies.

All chemical test methods or kits should be inspected for damage prior to use. Each of these tests or kits often has an expiration date, which should be checked as well. No kit or method will be used that is past its expiration date under any circumstance. Methodology should be read and understood before it is actually used in the field. It is often prudent to perform "dry runs" inside before attempting the test in the field.

All data from chemical methods should be recorded in the logbook, including calibration information as per Section 4.3 of the QAPP, all dilution and extraction data, weights of samples, and ambient air conditions.

12.3 PAH SAMPLING PROCEDURE

The polycyclic aromatic hydrocarbon (PAH) field test kits will be used for the determination of concentrations in the soil and sediments. The PAH screening shall include the assay range for semi quantitative results. The minimum reliability limit is 1 parts per million (ppm). Concentrations shall be measured as ppm.

The procedure include:

- Extract and dilute the soil sample using the SDI sample extraction kit
- Pipet PAH assay diluent and either calibrator or sample extract into the antibody coated tubes
- Add PAH enzyme conjugate to the tubes

- Wait 15 minutes, decant, and wash the tubes
- Add substrate
- Wait 5 minutes then add stop solution
- Read the absorbance using a photometer
- Interpret the results

Across Site 3, the team shall establish a forty-foot grid. The team shall collect one 5-point PAH composite sample for every 200 cubic yards (320 tons). This is an estimated 20 samples.

Appendix A

A-1 Example Sampling and Analysis Summary

A-2 Example Project Quality Control Objectives

TABLE A-1
Example Sampling and Analysis Summary

Sample Location	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	TAT	QC Level	Required Analysis	Analytical Method	Holding Time
Sire 3 / Area Soils Volumetric	Monitoring Wells (10)	Soil	One per 200 cubic yards	20	Grab - composites noted areal location	Field time same day	Field OHM Standard	PAH field test kits 1-ppm detection limit	8260B 8015B 8015B	N/A
Site 3 Area Soils	Tank	Soil	Field limited	Variable	XRF - filed instrumentation	Field time same day	Field	XRF for TAL Metals	8260B 6010B/7000 160.2 160.1	N/A
Disposal		Soil	Once	1	Composite	14 days	OHM Standard	Full TCLP - Volatiles -Semi-volatiles -Metals -Pesticides -Herbicides	1311 -8260B -8270C -6010B/7000 -8081A -8151A	14 days leaching 14 days 7 days ext/40 days anal 6 months 7 days ext/40 days anal 7 days ext/40 days anal

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TABLE A-2
Example Project Quality Control Objectives

		Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
Method No	Analyte / Component	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
TCL VOLATILES BY GC/MS		ug/L	ug/kg	ug/L	ug/kg	%	%	%	%	%	%	%	%	%	%
8260B	Chloromethane	NS	NS	1.3	10	60-140	20-150	<30	<50	38-116	38-116	<50	<75	95	90
8260B	Bromomethane	NS	NS	1.1	10	60-140	20-150	<30	<50	49-117	49-117	<50	<75	95	90
8260B	Vinyl Chloride	NS	NS	1.1	10	60-140	20-150	<30	<50	31-121	31-121	<50	<75	95	90
8260B	Chloroethane	NS	NS	1	10	60-140	20-150	<30	<50	62-116	62-116	<50	<75	95	90
8260B	Methylene Chloride	NS	NS	0.3	10	60-140	20-150	<30	<50	55-126	55-126	<50	<75	95	90
8260B	Acetone	NS	NS	10	10	60-140	20-150	<30	<50	43-165	43-165	<50	<75	95	90
8260B	Carbon Disulfide	NS	NS	10	10	60-140	20-150	<30	<50	76-119	76-119	<50	<75	95	90
8260B	1,1-Dichloroethene	NS	NS	1.2	10	60-140	20-150	<30	<50	54-128	54-128	<50	<75	95	90
8260B	1,1-Dichloroethane	NS	NS	0.4	10	60-140	20-150	<30	<50	62-141	62-141	<50	<75	95	90
8260B	cis-1,2-Dichloroethene	NS	NS	1.2	10	60-140	20-150	<30	<50	70-131	60-141	<50	<75	95	90
8260B	trans-1,2-Dichloroethene	NS	NS	0.6	10	60-140	20-150	<30	<50	61-138	51-148	<50	<75	95	90
8260B	Chloroform	NS	NS	0.3	10	60-140	20-150	<30	<50	65-129	65-129	<50	<75	95	90
8260B	1,2-Dichloroethane	NS	NS	0.6	10	60-140	20-150	<30	<50	68-135	68-135	<50	<75	95	90
8260B	2-Butanone	NS	NS	10	10	60-140	20-150	<30	<50	50-163	50-163	<50	<75	95	90
8260B	1,1,1-Trichloroethane	NS	NS	0.8	10	60-140	20-150	<30	<50	68-135	68-135	<50	<75	95	90
8260B	Carbon Tetrachloride	NS	NS	2.1	10	60-140	20-150	<30	<50	67-125	67-125	<50	<75	95	90
8260B	Bromodichloromethane	NS	NS	0.8	10	60-140	20-150	<30	<50	68-135	58-145	<50	<75	95	90
8260B	1,2-Dichloropropane	NS	NS	0.4	10	60-140	20-150	<30	<50	76-132	76-132	<50	<75	95	90
8260B	Cis-1,3-Dichloropropene	NS	NS	1	10	60-140	20-150	<30	<50	70-122	70-122	<50	<75	95	90
8260B	Trichloroethylene	NS	NS	1	10	60-140	20-150	<30	<50	67-137	67-137	<50	<75	95	90
8260B	Dibromochloromethane	NS	NS	0.5	10	60-140	20-150	<30	<50	64-120	64-120	<50	<75	95	90
8260B	1,1,2-Trichloroethane	NS	NS	1	10	60-140	20-150	<30	<50	70-141	70-141	<50	<75	95	90
8260B	Benzene	NS	NS	0.4	10	60-140	20-150	<30	<50	51-139	51-139	<50	<75	95	90
8260B	trans-1,3-Dichloropropene	NS	NS	1.4	10	60-140	20-150	<30	<50	42-154	42-154	<50	<75	95	90
8260B	Bromoform	NS	NS	1.2	10	60-140	20-150	<30	<50	67-129	67-129	<50	<75	95	90
8260B	4-Methyl-2-Pentanone	NS	NS	10	10	60-140	20-150	<30	<50	77-119	77-119	<50	<75	95	90
8260B	2-Hexanone	NS	NS	10	10	60-140	20-150	<30	<50	47-165	47-165	<50	<75	95	90
8260B	Tetrachloroethylene	NS	NS	1.4	10	60-140	20-150	<30	<50	67-131	67-131	<50	<75	95	90
8260B	Toluene	NS	NS	1.1	10	60-140	20-150	<30	<50	31-137	31-137	<50	<75	95	90
8260B	1,1,2,2-Tetrachloroethane	NS	NS	0.4	10	60-140	20-150	<30	<50	55-138	55-138	<50	<75	95	90
8260B	Chlorobenzene	NS	NS	0.4	10	60-140	20-150	<30	<50	69-140	69-140	<50	<75	95	90
8260B	Ethylbenzene	NS	NS	0.6	10	60-140	20-150	<30	<50	59-140	59-140	<50	<75	95	90
8260B	Styrene	NS	NS	0.4	10	60-140	20-150	<30	<50	71-133	71-133	<50	<75	95	90
8260B	Xylenes, Total	NS	NS	1.3	10	60-140	20-150	<30	<50	68-133	68-133	<50	<75	95	90
8260B	4-Bromofluorobenzene (Surr)					75-125	65-135								
8260B	1,2-Dichloroethane-d4 (Surr)					62-139	52-149								
8260B	Toluene-d8 (Surr)					75-125	65-135								

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TABLE A-2
Example Project Quality Control Objectives

Method No	Analyte / Component	Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
TAL METALS BY ICP		mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	%	%	%	%	%	%	%	%
6010B	Aluminum	NS	NA	0.2	22.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Antimony	NS	NA	0.06	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Arsenic	NS	NA	0.01	40.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Barium	NS	NA	0.2	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Beryllium	NS	NA	0.005	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Cadmium	NS	NA	0.005	0.50	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Calcium	NS	NA	5	100	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Chromium	NS	NA	0.01	20	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Cobalt	NS	NA	0.05	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Copper	NS	NA	0.025	2.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Iron	NS	NA	0.1	3.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Lead	NS	NA	0.003	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Magnesium	NS	NA	5	100	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Manganese	NS	NA	0.015	2.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Nickel	NS	NA	0.04	2.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Potassium	NS	NA	5	600	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Selenium	NS	NA	0.005	3.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Silver	NS	NA	0.01	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Sodium	NS	NA	5	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Thallium	NS	NA	0.01	6.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Vanadium	NS	NA	0.05	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Zinc	NS	NA	0.02	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
MERCURY BY COLD VAPOR		mg/L	mg/kg	mg/L	mg/kg	%	%	%	%	%	%	%	%	%	%
7470A	Mercury	NS	NA	0.001	NA	50-150	NA	<30	NA	70-130	NA	<50	NA	95	NA
7471A	Mercury	NA	NS	NA	NA	50-150	NA	<30	NA	70-130	NA	<50	NA	95	NA

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TABLE A-2
Example Project Quality Control Objectives

Project #
838067

Method No	Analyte / Component	Project Action Limits TCLP	Minimum PQL TCLP	Accuracy Limits MS/MSD Recoveries TCLP	Precision Limits MS/MSD Deviation TCLP	Accuracy Limits LCS Recoveries TCLP	Precision Limits Field Dup Deviation TCLP	Completeness Limits TCLP
TCLP Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8260B	1,1-Dichloroethylene	0.7	0.1	50-150	<50	70-130	<50	90
8260B	1,2-Dichloroethane	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Benzene	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Carbon Tetrachloride	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	90
8260B	Chloroform	6	1	50-150	<50	70-130	<50	90
8260B	Methyl Ethyl Ketone	200	20	50-150	<50	70-130	<50	90
8260B	Tetrachloroethylene	0.7	0.7	50-150	<50	70-130	<50	90
8260B	Trichloroethylene	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Vinyl Chloride	0.2	0.05	50-150	<50	70-130	<50	90
TCLP Semi-Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8270C	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	90
8270C	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	90
8270C	2,4,6-Trichlorophenol	2	0.4	50-150	<50	70-130	<50	90
8270C	2,4-Dinitrotoluene	0.13	0.02	50-150	<50	70-130	<50	90
8270C	Cresol	200	40	50-150	<50	70-130	<50	90
8270C	Hexachlorobenzene	0.13	0.02	50-150	<50	70-130	<50	90
8270C	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	90
8270C	Hexachlorobutadiene	0.5	0.4	50-150	<50	70-130	<50	90
8270C	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	90
8270C	Pentachlorophenol	100	80	50-150	<50	70-130	<50	90
8270C	Pyridine	5	1	50-150	<50	70-130	<50	90
TCLP Pesticides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8081A	Endrin	0.02	0.004	50-150	<50	70-130	<50	90
8081A	Lindane	0.4	0.08	50-150	<50	70-130	<50	90
8081A	Methoxychlor	10	1	50-150	<50	70-130	<50	90
8081A	Toxaphene	0.5	0.1	50-150	<50	70-130	<50	90
8081A	Chlordane	0.03	0.005	50-150	<50	70-130	<50	90
8081A	Heptachlor and its Hydroxide	0.008	0.001	50-150	<50	70-130	<50	90

Site ID
SJCA, VA

TABLE A-2
Example Project Quality Control Objectives

Project #
838067

		Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
Method No	Analyte / Component	TCLP	TCLP	TCLP	TCLP	TCLP	TCLP	TCLP
TCLP Herbicides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8151A	2,4-D	10	2	50-150	<50	70-130	<50	90
8151A	2,4,5-TP	1	0.2	50-150	<50	70-130	<50	90
TCLP Metals		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
6010B	Arsenic	5	1	50-150	<50	70-130	<50	90
6010B	Barium	100	20	50-150	<50	70-130	<50	90
6010B	Cadmium	1	0.2	50-150	<50	70-130	<50	90
6010B	Chromium	5	1	50-150	<50	70-130	<50	90
6010B	Lead	5	1	50-150	<50	70-130	<50	90
7470A	Mercury	0.2	0.04	50-150	<50	70-130	<50	90
6010B	Selenium	1	0.2	50-150	<50	70-130	<50	90
6010B	Silver	5	1	50-150	<50	70-130	<50	90

Project Instructions for St. Juliens Creek Annex, Confirmatory Sampling for Sites 3 and 6 Removal

PREPARED FOR:	Bill Friedmann/CH2M HILL - VBO Dan Holloway/CH2M HILL - VBO
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DATE:	August 2, 2002

INTRODUCTION

This technical memorandum provides the approach for conducting confirmatory sampling at Sites 3 and 6, at the St. Juliens Creek Annex, Chesapeake, Virginia. In addition to collecting confirmatory samples, this memo will also describe the process for determining if the removal of waste and soils at the sites have mitigated risk through the use of the background 95% upper tolerance limits (UTL), in-field statistical tools, and professional judgement.

The proposed investigation encompasses soil sampling at approximately 30 sample locations (five samples at Site 6 and twenty-five samples at Site 3) to confirm the complete removal of soil/waste which has previously been identified as potentially posing a risk to human health and the environment as identified in the *Final Remedial Investigation/Human Health/Ecological Risk Assessment for Site 3, 4, 5, & 6, St. Juliens Creek Annex, Chesapeake, Virginia* (CH2M HILL, August 2002). The removal of soil/waste and sediment (in fiscal year 2003) will be conducted by the Navy RAC contractor (SHAW E & I). During implementation of the removal action at Sites 3 and 6, CH2M HILL will be on-site to observe the removal action, determine if clean up levels in soil have been met, and collect confirmatory samples for site close out.

The remainder of the project instructions will discuss site background, project contacts, field activities, project schedule, and site specific health and safety.

SITE BACKGROUND

A Remedial Investigation (RI) for Sites 3 and 6 determined the potential risk to human health and the environment. Field investigations confirmed the presence of physical and chemical waste at these sites. Based upon these findings, the Navy has chose to conduct a non-time-critical-removal-action (NTCRA) to remove waste and mitigate potential risks present at these sites.

An Engineering Evaluation/Cost Analysis (EE/CA) explored several different options for addressing the NTCRA at these sites. The options were narrowed down to three potentially acceptable alternatives. Based on the cost, effectiveness, and implementability of each alternative, an alternative was selected which involved the removal of soils at Site 6 and waste, soil, and sediment at Site 3. This alternative was selected since it best achieved the removal of potential risk at the sites, thus protecting human health and the environment.

PROJECT CONTACTS

Contacts for this task are as follows:

CH2M Hill Project Team

• Activity Manager	Bill Friedmann\VBO	757-460-3734 x19
• Project Manager	Bill Friedmann\VBO	757-460-3734 x19
• Field Team Leader	Bill Friedmann\VBO	757-460-3734 x19 Cell: 373-3943
• Field Team Member	Dan Holloway\VBO	757-460-3734x30
• Project Chemist	Ann West\WDC	703-571-6405 x4643
• Health and Safety	John Longo/NJO	973-316-0159 x4543

RAC Contractor

• SHAW E & I	Taylor Sword	757-318-5142

Government Contacts

• LANTDIV PM	Dawn Hayes	757-322-4792
• Navy Regional	Valerie Walker	757-877-4775

Subcontractors

- Laboratory (for TAL metals and TCL SVOCs)

  Compuchem 919-379-4100
  501 Madison Avenue
  Cary, NC 27513
  Contact: Kathy Dover

- Laboratory (for dioxin/furans)

  Severn Trent Services (330) 996-7269
  4101 Shuffel Drive NW
  North Canton, OH 44720-6361
  Contact: Deborah Budd

- Data Validator E Data, Inc. 414-475-5503

2262 N. 71st Street Fax: 603-947-6251
Wauwatosa, WI 53213

Sampling will be conducted using the procedures described in this memorandum and in the *Final Master Project Plan, Naval Station Norfolk, St. Juliens Creek Annex, Chesapeake, Virginia* (CDM, July 2000).

FIELD ACTIVITIES

The field activities can be divided into the following distinct phases:

- Field Screening Sampling and Statistical Comparison
- Confirmatory Samples
- Sample Collection, Identification, and Handling
- Quality Control Samples
- Decontamination

In order to determine if the waste and soil which pose a potential risk have been mitigated at Sites 3 and 6, samples will be collected, analyzed, compared to the background 95% UTL, and entered into a statistical program comparing the means of the site and background data. Two types of samples will be collected; screening samples and confirmatory samples. The following two sections describe the purpose of each type of sample (field screening and confirmatory), at what point during removal each type of sample will be collected, and the statistical comparisons to be conducted on the sample data for determining when removal is complete. A flow chart which addresses this process is presented as Figure 1.

Field Screening Samples

Field screening samples at Sites 3 and 6 will be collected by Shaw E & I following the removal of waste and soils identified in the *Final Engineering Evaluation/Cost Analysis for Sites 3 & 6* (CH2M HILL, June 2002). The areas identified for removal are shown on Figure 2. Screening samples will be collected from the excavation floor and side walls as determined in the field by Shaw E & I. Although sample depths may vary based on in-field observations, side wall samples will target two sampling depths; from 0 to 6 inches and from 1 to 3 feet. The targeted sampling depths are consistent with previous sampling depths conducted in the RI and would be applicable for comparison to human health and ecological screening values for the purposes of site closure.

Screening samples will be analyzed for metals and polycyclic aromatic hydrocarbons (PAHs) using in-field instrumentation as specified in the Shaw E & I removal work plan.

The results of the screening samples will be compared to the background 95% upper tolerance limit (UTL) established for Dredge Fill soil as determined in the *Final Background Investigation for St. Juliens Creek Annex, Chesapeake, Virginia* (CH2M HILL, October 2001). Table 1 presents the background 95% UTLs for Dredge Fill soils and identify the risk drivers at Site 3 and 6. If the results of the in-field screening analysis indicate that all risk drivers identified in quantitative risk assessment presented in the RI are below the background 95%

UTL, removal of materials will cease and confirmatory samples will be collected for the purposes of site closure.

In the instance when screening samples indicate exceedences of the background UTL for risk drivers compounds, the on-site CH2M HILL geologist will use professional judgement with assistance of an in-field statistical program to determine if concentration of constituents in soil are statistically similar to background and the extent of removal is complete.

The EPA has suggested that in addition to a background UTL comparison, a central tendency comparison between the site and background data be performed. To facilitate an in-field comparison, EPA suggested comparing the 95% UCL of the mean site data to the 95% UCL of the mean background data be performed during the in-field removal using an assumption of normality for the data. This approach was tested on existing RI site data. Though the comparison of the 95% UCL or the mean site data to the 95% UCL of the mean background data is more accurate in drawing conclusions of the average site concentrations than a simple background UTL comparison, this approach differed greatly from more formal statistical comparisons. The comparison of UCLs as a central tendency comparisons, although simple, is inherently flawed, particularly when the variances of the two populations differ substantially.

An improved field tool is the use of Satterthwaite's two-sample t-test for unequal variances. It is recommended that this approach be used rather than the 95% UCL of the mean comparison for in-field statistical analysis. This approach has a reasonable agreement with the 'formal' statistical approach (as conducted for the RI). Table 2 provides a comparison of 'formal' statistics (column highlighted in blue) applied to the RI data with the two sample t-test as well as the 95% UCL mean comparison approach. The comparison indicates greater agreement to the two sample t-test comparison, particularly with regards to metals.

In addition to the background 95% UTL and in-field statistical comparison, the on-site geologist may also confer with the Navy, VDEQ and USEPA for guidance in determining whether further removal is required prior to collection of the confirmatory samples.

Confirmatory Samples

Following completion of removal of waste and soils, confirmation samples will be collected for the purposes of site closure (Site 6 closure in Fiscal Year 2002 [FY02] and site closure in FY03).

A minimum of five confirmatory samples will be collected from Site 6 (four side wall samples and one bottom sample) as depicted in Figure 3. Confirmatory samples for Site 6 will be analyzed for target analyte list (TAL) metals by contract laboratory program (CLP) (ILM03 or latest version) and target compound list (TCL) SVOCs by CLP (OLM03 or latest version). Parameter specific reporting limits are provided in Appendix A.

It is estimated that 3,950 tons of waste and soil will be removed from Site 3 during FY02. Based on an estimated depth of three feet, the area of removal for Site 3 will be approximately 24,000 ft^2. Twenty-five confirmatory samples will be collected at Site 3 (twelve samples from the excavation floor and 13 samples from the side walls). The distribution of samples based on this area are presented on Figure 4. No side wall sample will be collected from the eastern wall of the excavation since it is scheduled to be removed in FY03. As with screening samples, confirmatory samples of the side wall samples will target two sampling depths; from 0 to 6 inches and from 1 to 3 feet. The twenty-five confirmatory samples from Site 3 will be analyzed for TAL metals and TCL SVOCs. Additionally, five of the samples will be analyzed for dioxin/furans by SW846 Method 8290.

With the exception of dioxin/furans, unvalidated analytical results will be received within 48 hours upon laboratory receipt. Following receipt of sample results from the laboratory, the data will be compared against the background 95% UTL in the same manner as with the screening samples. Additional decisions on further removal may be made based on the results of the confirmatory samples; either removal will be complete and backfilling activities may begin or further removal may be necessary. As with screening sample results, the on-site geologist may confer with the Navy, VDEQ and USEPA for guidance.

Sample Collection, Identification, and Handling

Confirmatory samples will be collected using stainless steel hand augers or hand trowels following the standard operating procedures for soil sampling as described in the Final Master Project Plans. Sample locations will be surveyed with a GPS unit and depths will be noted in the field book.

A standardized numbering system will be used to identify all samples collected during confirmatory sampling. The numbering system will provide a tracking procedure to ensure accurate data retrieval of all samples collected. A listing of the sample identification numbers will be maintained by the field team leader, who will be responsible for enforcing the use of the standardized numbering system during all sampling activities. The sample identification for all samples collected during this investigation will use the format examples below:

Confirmatory Soil Sample ID scheme (example is for subsurface soil):

SJS06-CS1-SB01-003:	St. Juliens Creek Annex
SJS**06**-CS1-SB01-003:	Site ID (Site 6)
SJS06-**CS1**-SB01-003:	Confirmatory sample (**CS1** = taken from floor; **CS2** = taken from wall)
SJS06-CS1-**SB**01-003:	Sub-surface Soil sample (**SB** = subsurface soil; **SS** = surface soil)
SJS06-CS1-SB**01**-003:	Sample number (samples will be numbered in sequential order regardless of whether taken from the floor or wall)
SJS06-CS1-SB01-**003**:	Depth Interval (2-3' below ground surface). For Surface soil sample (0 to 6 inches), 000 will be used.
SJS06-CS1-SB01-003-**P**:	Duplicate sample
SJS06-**EB-071502**:	Equipment blank taken July 15, 2002
SJS06-**FB-071502**:	Field blank taken July 15, 2002

Analysis:	TCL semivolatiles by CLP (OLM03 or latest version)
	TAL metals/cyanide by CLP (ILM03 or latest version)
	Dioxin/furans by SW846 Method 8290

Samples:	Approximately 25, but may vary depending on extent of excavation.
Estimated Duplicates:	3
Estimated Field Blanks:	3
Estimated Equipment Blanks:	3
Estimated MS/MSD:	2

Sample handling involves field-related considerations concerning field sample documentation, nomenclature, packaging, shipping, and custody. Sample packaging and shipping procedure can also be found in the site Quality Assurance Project Plan. The offsite laboratories that will be used for this sampling event is Compuchem, of Cary, North Carolina (for SVOCs and metals) and Severn Trent Laboratories (for dioxin/furans). TAL metals and TCL SVOCs will have a 48 hour turnaround time to aid in determining if removal of potential risk has been completed.

Sample containers, coolers, deionized water for collection of QC samples, and supplies from the lab will arrive at VBO no later than August 10, 2002, in care of Dan Holloway.

Quality Control Samples

In addition to appropriate documentation and daily calibration of field equipment, quality control (QC) samples will be collected during environmental sampling activities. QC samples include field duplicates and field-related QC samples. The following are the requirements for QC sample collection:

- Field Duplicates – One duplicate per 10 samples of similar matrix.
- Equipment Rinsate Blanks – One rinsate blank per day per matrix.
- Field Blanks – One per week if an equipment rinsate was collected each day. If windy conditions exist, field blanks should be collected daily.
- Matrix Spike/Duplicate Samples – One set per 20 samples of similar matrix.

Decontamination

Non-disposable equipment involved in the field sampling activities will be decontaminated prior to and during sampling activities and include hand augers, trowels, and bowls. Waste generated during the decontamination of these items is expected to consist of decontamination fluids at small quantities (less than five gallons per day). Decontamination fluids will be disposed of with the removed waste, soils, or sediment.

Disposable equipment includes personal protective equipment (PPE), such as gloves, as well as poly sheeting, paper towels, and aluminum foil. This equipment will be disposed as solid waste.

PROJECT SCHEDULE

Removal activities are scheduled to begin the week of August 19, 2002. It is estimated that is will require approximately 10 days to remove soils/waste from Site 3 and removal of soils from Site 6 will require less than 3 days. Limits in funding will restrict the amount of material which will be removed during FY02. Complete removal of Site 6 and partial removal of waste and soil at Site 3 will be accomplished during the August 2002 mobilization. Completion of the waste and soil removal at Site 3 as well as sediments from Site 3 will be completed in FY03.

SITE SPECIFIC HEALTH AND SAFETY

Bill Friedmann, as field team leader and site safety coordinator for CH2M HILL, will conduct a short health and safety meeting at the beginning of each work day with other members of the CH2M HILL field team (if present). In addition, all CH2M HILL field personnel must read the Master Health and Safety Plan contained in the Final Master Project Plan, these project instructions prior to going into the field, and must sign the employee signoff sheet contained within. The Health and Safety Checklists are provided as Attachment B.

All clearing of ordnance explosives (OE) or unexploded ordnance (UXO) will be the responsibility of SHAW E & I. CH2M HILL field personnel on site must remain a safe distance away from active removal activities. Only when activities have ceased (i.e. excavating/loading soil and waste debris) may CH2M Hill field personnel approach the excavation area. Additionally, CH2M HILL employees involved in field activities are required to review the SHAW E & I UXO health and Safety work plan. All CH2M HILL employees will be responsible for following the CH2MHILL Standard of Practices **HSE-32 (Excavations)** and **91 (Ordnance Explosives)**. No confined-space entry will be permitted by CH2M HILL staff.

Table 1
Upper Tolerance Limit (95%) for Dredge Fill
St. Juliens Creek Annex Background Investigation

Soil Type	**Dredge & Fill**		
Soil Depth	**S/S**	**SRF**	**SUB**
Chemical Name			
Metals			
Silver (mg/Kg)	0.67		
Aluminum (mg/Kg)		22786	18839
Arsenic (mg/Kg)		24	14
Barium (mg/Kg)		98	50
Beryllium (mg/Kg)		1	0.81
Calcium (mg/Kg)	3251		
Cobalt (mg/Kg)	13		
Chromium (mg/Kg)		45	39
Copper (mg/Kg)		58	40
Iron (mg/Kg)		45805	36585
Mercury ((mg/Kg))		1.3	0.62
Potassium ((mg/Kg))		4577	3465
Magnesium (mg/Kg)		4507	3847
Mangane (mg/Kg)		198	151
Sodium (mg/Kg)		620	203
Nickel (mg/Kg)		19	15
Lead (mg/Kg)		147	86
Antimony (mg/Kg)	1.47		
Selenium (mg/Kg)		2.2	1.5
Vanadium (mg/Kg)		70	42
Zinc (mg/Kg)		137	87
Semi-volatiles			
Acenaphthene (ug/Kg)	592		
Acenaphthylene (ug/Kg)		246	131
Anthracene (ug/Kg)	462		
Benzo(a)anthracene (ug/Kg)	2027		
Benzo(a)pyrene (ug/Kg)	1785		
Benzo(b)fluoranthene (ug/Kg)		3197	2335
Benzo(g,h,I)perylene (ug/Kg)		1655	2099
Benzo(k)fluoranthene (ug/Kg)	2038		
Chrysene (ug/Kg)	3487		
Dibenz(a,h)anthracene (ug/Kg)		714	708
Fluoranthene (ug/Kg)	2766		
Fluorene (ug/Kg)	602		
Indeno(1,2,3-cd)pyrene (ug/Kg)		1829	1769
Naphthalene (ug/Kg)	485		
Phenanthrene (ug/Kg)	913		
Pyrene (ug/Kg)	2590		

Identified risk driver for Site 3.
Identified risk driver for Site 6.
Identified risk driver for both Sites 3 & 6.
S/S - UTL calculated from combined surface and subsurface soil data.
SRF - UTL calculated from surface soil data only.
SUB - UTL calculated from subsurface data onl

Table 2
Comparison of In-Field Statistical Analysis vs. Formal Comparison of the Central Tendencies

Chemical Group	Matrix	Parameter	Formal' Approach Distribution	Formal' Approach Sig Level = 0.20	Two Sample t-Test Sig Level = 0.05	Two Sample t-Test Sig Level = 0.10	Two Sample t-Test Sig Level = 0.20	Comparison of 95% UCLs
METAL	SB	ALUMINUM	Nonparametric	no	no	no	no	no
METAL	SS	ALUMINUM	Normal	no	no	no	no	no
METAL	SO	ANTIMONY	Nonparametric	no	no	Yes	Yes	Yes
METAL	SB	ARSENIC	Nonparametric	no	no	no	no	no
METAL	SS	ARSENIC	Nonparametric	no	no	no	no	Yes
METAL	SB	BARIUM	Nonparametric	no	no	no	Yes	Yes
METAL	SS	BARIUM	Nonparametric	no	no	Yes	Yes	Yes
METAL	SB	BERYLLIUM	Nonparametric	Yes	Yes	Yes	Yes	Yes
METAL	SS	BERYLLIUM	Nonparametric	Yes	Yes	Yes	Yes	Yes
METAL	SB	CADMIUM	Nonparametric	no	no	no	Yes	Yes
METAL	SS	CADMIUM	Nonparametric	no	no	Yes	Yes	Yes
METAL	SO	CALCIUM	Lognormal	Yes	Yes	Yes	Yes	Yes
METAL	SB	CHROMIUM	Nonparametric	no	no	no	no	Yes
METAL	SS	CHROMIUM	Nonparametric	no	no	no	no	Yes
METAL	SO	COBALT	Nonparametric	no	no	no	no	no
METAL	SB	COPPER	Nonparametric	no	no	no	Yes	Yes
METAL	SS	COPPER	Nonparametric	no	no	Yes	Yes	Yes
METAL	SB	IRON	Nonparametric	no	no	no	no	Yes
METAL	SS	IRON	Nonparametric	no	no	no	no	Yes
METAL	SB	LEAD	Nonparametric	no	no	no	Yes	Yes
METAL	SS	LEAD	Nonparametric	no	no	Yes	Yes	Yes
METAL	SB	MAGNESIUM	Nonparametric	no	no	no	no	no
METAL	SS	MAGNESIUM	Normal	no	no	no	no	no
METAL	SB	MANGANESE	Nonparametric	no	no	Yes	Yes	Yes
METAL	SS	MANGANESE	Nonparametric	no	no	Yes	Yes	Yes
METAL	SB	MERCURY	Nonparametric	no	no	no	no	no
METAL	SS	MERCURY	Normal	no	no	no	no	no
METAL	SB	NICKEL	Nonparametric	no	no	no	no	Yes
METAL	SS	NICKEL	Nonparametric	no	no	no	no	Yes
METAL	SB	POTASSIUM	Nonparametric	no	no	no	no	no
METAL	SS	POTASSIUM	Normal	no	no	no	no	no
METAL	SB	SELENIUM	Nonparametric	no	no	no	no	no
METAL	SS	SELENIUM	Nonparametric	no	no	no	no	no
METAL	SO	SILVER	Nonparametric	no	no	no	Yes	Yes
METAL	SB	SODIUM	Nonparametric	no	Yes	Yes	Yes	Yes
METAL	SS	SODIUM	Nonparametric	no	no	no	no	no
METAL	SB	THALLIUM	Nonparametric	no	no	no	no	no
METAL	SS	THALLIUM	Nonparametric	no	no	no	no	Yes
METAL	SB	VANADIUM	Nonparametric	no	no	no	no	no
METAL	SS	VANADIUM	Normal	no	no	no	no	no
METAL	SB	ZINC	Nonparametric	no	no	Yes	Yes	Yes
METAL	SS	ZINC	Nonparametric	no	no	Yes	Yes	Yes
SVOA	SS	2-METHYLNAPHTHALENE	Nonparametric	no	no	no	no	no
SVOA	SO	ACENAPHTHENE	Nonparametric	Yes	no	Yes	Yes	Yes
SVOA	SB	ACENAPHTHYLENE	Nonparametric	Yes	Yes	Yes	Yes	Yes
SVOA	SS	ACENAPHTHYLENE	Nonparametric	Yes	no	no	Yes	Yes
SVOA	SO	ANTHRACENE	Nonparametric	Yes	no	no	no	no
SVOA	SO	BENZO(A)ANTHRACENE	Lognormal	no	no	no	no	no
SVOA	SO	BENZO(A)PYRENE	Nonparametric	no	no	no	no	no
SVOA	SB	BENZO(B)FLUORANTHENE	Nonparametric	no	no	no	no	no
SVOA	SS	BENZO(B)FLUORANTHENE	Nonparametric	no	no	no	no	no
SVOA	SB	BENZO(G,H,I)PERYLENE	Nonparametric	no	no	no	no	no
SVOA	SS	BENZO(G,H,I)PERYLENE	Nonparametric	no	no	no	no	no
SVOA	SO	BENZO(K)FLUORANTHENE	Lognormal	no	no	no	no	no
SVOA	SS	BIS(2-ETHYLHEXYL)PHTHALATE	Nonparametric	Yes	Yes	Yes	Yes	Yes
SVOA	SS	CARBAZOLE	Nonparametric	no	no	no	no	no
SVOA	SO	CHRYSENE	Lognormal	no	no	no	no	no
SVOA	SS	DI-N-BUTYLPHTHALATE	Nonparametric	no	no	no	no	no
SVOA	SB	DIBENZ(A,H)ANTHRACENE	Nonparametric	Yes	no	no	no	no
SVOA	SS	DIBENZ(A,H)ANTHRACENE	Normal	no	no	no	no	no
SVOA	SS	DIBENZOFURAN	Nonparametric	no	no	no	no	no
SVOA	SS	DIETHYLPHTHALATE	Nonparametric	no	no	no	no	no
SVOA	SO	FLUORANTHENE	Nonparametric	no	no	no	no	no
SVOA	SO	FLUORENE	Nonparametric	Yes	no	no	Yes	no
SVOA	SB	INDENO(1,2,3-CD)PYRENE	Nonparametric	no	no	no	no	no
SVOA	SS	INDENO(1,2,3-CD)PYRENE	Nonparametric	no	no	no	no	no
SVOA	SO	NAPHTHALENE	Nonparametric	Yes	Yes	Yes	Yes	Yes
SVOA	SS	PENTACHLOROPHENOL	Nonparametric	no	no	no	no	no
SVOA	SO	PHENANTHRENE	Nonparametric	Yes	no	no	no	no
SVOA	SO	PYRENE	Nonparametric	no	no	no	no	no

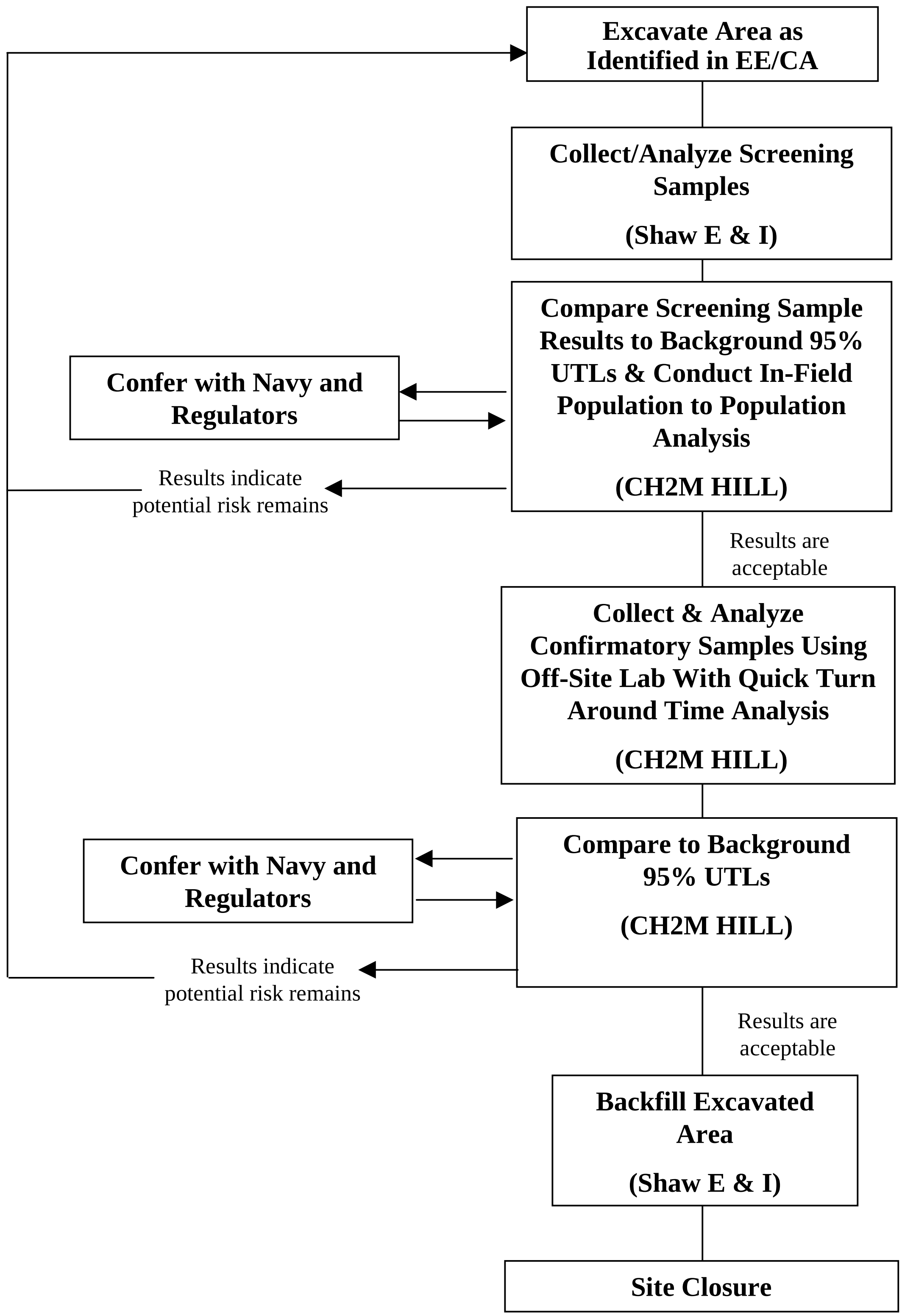
Formal Decision of Whether Site Exceeds Background

Cases Where Alternative Method Indicates an Exceedance and Formal Approach Does Not Indicate an Exceedance.

Cases Where Alternative Method Does Not Indicate an Exceedance but Formal Approach Does Indicate an Exceedance.

Figure 1

Procedural Flow Chart for Sites 3 & 6



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LEGEND

Area of Removal

N

0 80 160 Feet

Figure 2
Removal of Site 3 & 6
Project Instructions
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

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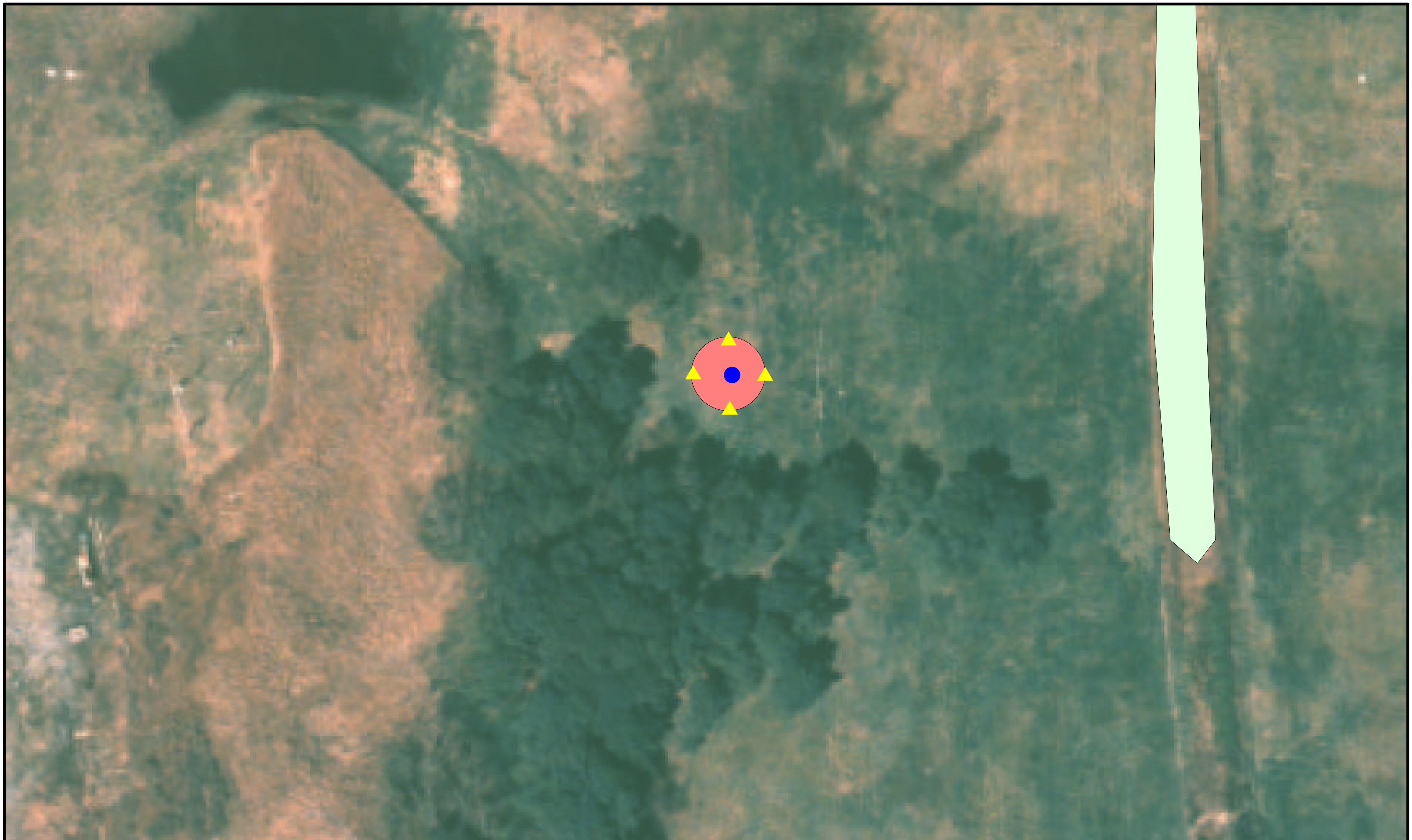

LEGEND

Site 6 Removal Area (all of Site 6 to be removed in FY02)

Floor Samples

Sidewall Samples (greater than 1 foot depth)

N

0 50 100 Feet

Figure 3
Final Confirmatory Sample Location
Site 6
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

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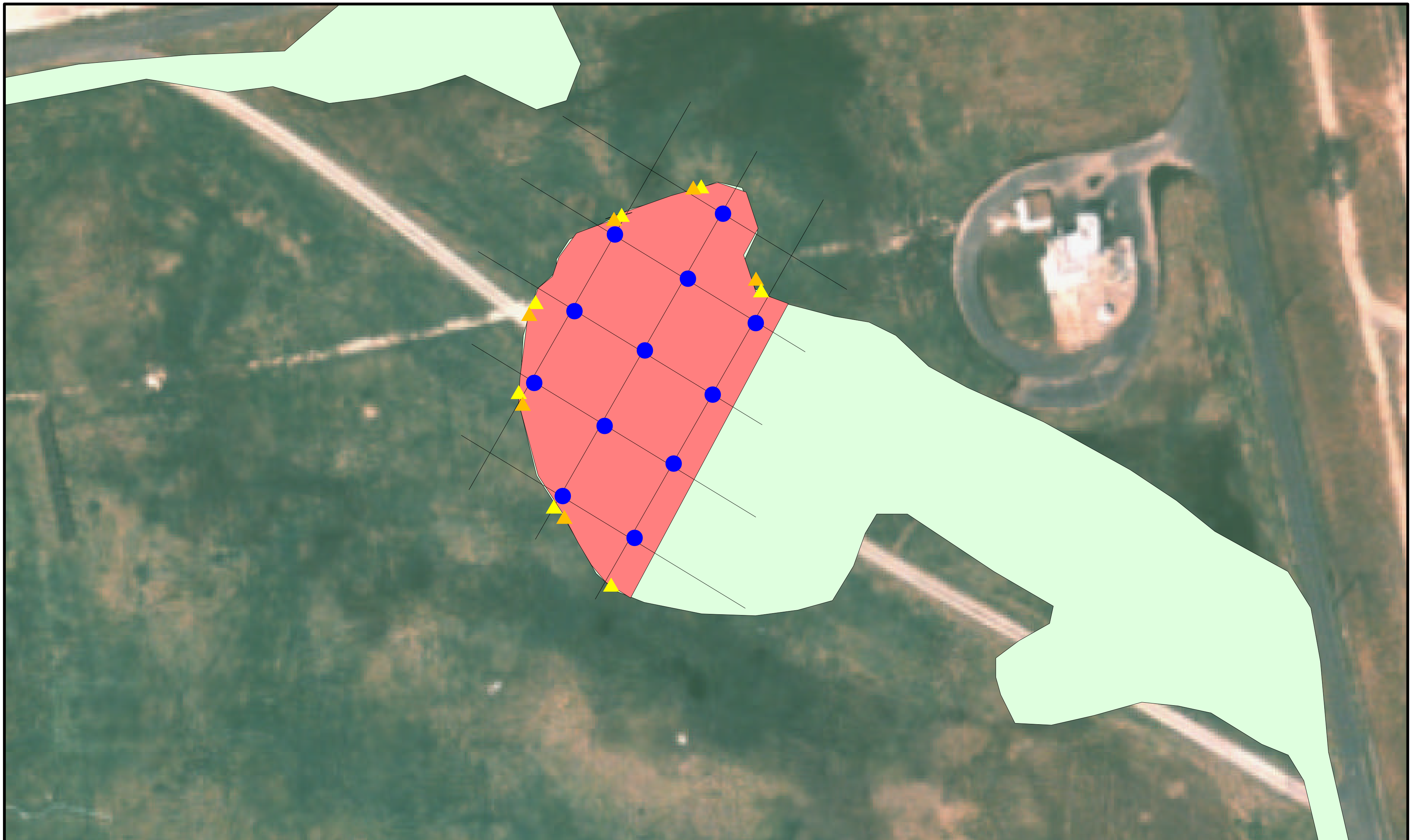

LEGEND

- Site 3 Removal Area
- Estimated Removal Area for FY02
- Floor Samples
- Sidewall Samples (greater than 1 foot depth)
- Sidewall Samples (0 to 6 inch depth)

N

0 50 100 Feet

Figure 4
Final Confirmatory Sample Locations
Site 3
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

ATTACHMENT A
PARAMETER SPECIFIC REPORTING LIMITS

STL SW8290 Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High Resolution Gas Chromatography / High Resolution Mass Spectrometry (HRGC/HRMS)

This method provides instrument and extraction procedures for the detection and quantitation of PCDDs (tetra through octa-chlorinated homologues) and PCDFs (tetra through octa-chlorinated homologues) in a variety of sample matrices in part-per-trillion (ppt) to part-per-quadrillion (ppq) concentrations.

Method SW8290 is used to detect dioxins and furans in variety of matrices and uses additional quality controls to allow more sophisticated determinations of detection limits and matrix spike recoveries than other routine GC and GC/MS methods.

SW8290 requires isotopically labeled analogs of target analytes to be spiked into each sample before extraction, and uses nine ^{13}C labeled analogs, one furan and one dioxin at each chlorination level (13C-OCDF is not used). By adding a known amount of a labeled compound to every sample prior to extraction, correction for recovery of the CDD/CDF can be made because the CDD/CDF and its labeled analog exhibit similar effects upon extraction, cleanup, concentration, and gas chromatography. Target analytes are quantitated relative to the labeled analog and therefore their calculated concentration compensates for extraction and cleanup efficiencies.

STL Method SW8290 provides a three tiered approach to reporting and detection limits. In the absence of target analytes, a sample specific estimated detection limit (EDL) is calculated based on signal-to-noise (S/N) ratios at the retention time of the analyte. The target analyte is then reported as “not detected” at the EDL. When target analytes that meet method identification criteria and are free of interferences (e.g. DPE interference) are found, they are reported down to the lowest calibration standard concentration (see reporting limits in table 1). Below the lower calibration limit (LCL) (Table 1), qualitatively confirmed analytes are reported as “estimated” down to the target detection limit

(TDL) to denote the less certain quantitation and the value is "J" flagged. The TDL is a value set by the laboratory at which there is no significant chance of false positives (usually set at one-half the LCL value). If there is a peak below the TDL, a detection limit based on the ion peaks is calculated and the target analyte is reported as "not detected" at the calculated detection limit. Second column confirmation will be performed only for 2,3,7,8-TCDF presumptive positives greater than the TDL.

A batch specific LCS (Laboratory Control Sample) is not required by Method 8290, however, STL still analyzes an LCS at a frequency of 1 per batch of 20 samples as an ongoing system and standard check. The target analyte concentrations for the LCS are given in Table 3. Sample matrix spikes and/or spike duplicates are performed only at client request. The spike concentrations are nominal values based on a full volume sample preparation (1000 mls for liquids and 10 grams for solids). If less than a full volume of sample is prepared due to sample matrix, sample availability, or method requirements, the spike amount will remain constant and therefore the spike concentrations will vary. See Table 4 and Table 5 for specific QC control and corrective action measures.

Toxicity Equivalence Factors (TEFs)

As per client request, the 2,3,7,8-TCDD toxicity equivalence will be calculated in accordance with the procedures given in U.S. EPA "Update of Toxicity Equivalence Factors (TEFs) for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs/CDFs)" March 1989 (EPA 625/3-89/016) and as described in the U.S. EPA Contract Laboratory Program Statement of Work, DFLM01.0. TEFs are assigned to each 2,3,7,8-substituted PCDDs/PCDFs in order to relate their toxicity to that of 2,3,7,8-TCDD. See Table 7 for the factors used to calculate TEFs. Note that EDL and detection limit values are not normally included in the TEQ adjusted concentration.

TABLE 1 REPORTING LIMITS
Method 8290 – STL, Sacramento

Parameter	Method	Analyte	Water[1] pg/L	Soil[2] pg/g
Dioxins/Furans	SW8290	Dioxins		
		2,3,7,8-TCDD	10	1.0
		1,2,3,7,8-PeCDD	50	5.0
		1,2,3,4,7,8-HxCDD	50	5.0
		1,2,3,6,7,8-HxCDD	50	5.0
		1,2,3,7,8,9-HxCDD	50	5.0
		1,2,3,4,6,7,8-HpCDD	50	5.0
		OCDD	100	10
		Furans		
		2,3,7,8-TCDF	10	1.0
		1,2,3,7,8-PeCDF	50	5.0
		2,3,4,7,8-PeCDF	50	5.0
		1,2,3,4,7,8-HxCDF	50	5.0
		1,2,3,6,7,8-HxCDF	50	5.0
		1,2,3,7,8,9-HxCDF	50	5.0
		2,3,4,6,7,8-HxCDF	50	5.0
		1,2,3,4,6,7,8-HpCDF	50	5.0
		1,2,3,4,7,8,9-HpCDF	50	5.0
		OCDF	100	10

Note: “Totals” values are available upon client request.

[1] Based upon a 1.0 liter sample aliquot. Sensitivity of the method depends on the level of interferences rather than instrumental limitations. Typical waste samples may have higher reporting limits and may require additional cleanup techniques.

[2] Based upon a 10.0 gram sample aliquot. Maximum RL for samples “as received”. Correction for moisture content may raise reporting limits above these levels. Typical waste samples may have higher reporting limits and may require additional cleanup techniques.

TABLE 2 CONTROL LIMITS FOR MATRIX SPIKES and MATRIX SPIKE DUPLICATES
Method 8290 – STL, Sacramento

Analytical Method	Spiking Compounds	Spike Amount Water (pg/L)	Spike Amount Soil/Sediment (pg/g)	% Recovery Water(c)	% Recovery Soil/Sediment(c)	Relative Percent Difference (RPD) Water	Relative Percent Difference (RPD) Soil/Sediment
STL SW8290	2,3,7,8-TCDF	200	20	70-132	59-140	20	20
	2,3,7,8-TCDD	200	20	75-126	60-141	20	20
	1,2,3,7,8-PeCDF	1000	100	74-131	64-140	20	20
	2,3,4,7,8-PeCDF	1000	100	62-137	61-141	20	20
	1,2,3,7,8-PeCDD	1000	100	82-124	65-140	20	20
	1,2,3,4,7,8-HxCDF	1000	100	84-124	66-137	20	20
	1,2,3,6,7,8-HxCDF	1000	100	75-128	60-138	20	20
	2,3,4,6,7,8-HxCDF	1000	100	71-146	65-148	20	20
	1,2,3,7,8,9-HxCDF	1000	100	73-144	59-146	20	20
	1,2,3,4,7,8-HxCDD	1000	100	70-135	52-152	20	20
	1,2,3,6,7,8-HxCDD	1000	100	76-127	62-138	20	20
	1,2,3,7,8,9-HxCDD	1000	100	66-142	58-147	20	20
	1,2,3,4,6,7,8-HpCDF	1000	100	74-131	64-138	20	20
	1,2,3,4,7,8,9-HpCDF	1000	100	73-135	58-145	20	20
	1,2,3,4,6,7,8-HpCDD	1000	100	82-124	65-137	20	20
	OCDF	2000	200	70-142	58-145	20	20
	OCDD	2000	200	82-128	64-143	20	20
(d)	^{13}C-2,3,7,8-TCDF	2000	200	40-135	40-135		
(d)	^{13}C-2,3,7,8-TCDD	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,7,8-PeCDF	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,7,8-PeCDD	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,4,7,8-HxCDF	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,6,7,8-HxCDD	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,4,6,7,8-HpCDF	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,4,6,7,8-HpCDD	2000	200	40-135	40-135		
(d)	^{13}C-OCDD	4000	400	40-135	40-135		

(c) Native compound limits are STL historical limits and are subject to change.
(d) Method default control limits. Signal-to-noise is also evaluated for data acceptability.

TABLE 3 CONTROL LIMITS FOR LABORATORY CONTROL SAMPLES (LCS)
Method 8290 – STL, Sacramento

Analytical Method	Spiking Compounds	Spike Amount Water (pg/L)	Spike Amount Soil/Sediment (pg/g)	% Recovery Water(c)	% Recovery Soil/Sediment(c)	Relative Percent Difference (RPD) Water	Relative Percent Difference (RPD) Soil/Sediment
STL SW8290	2,3,7,8-TCDF	200	20	70-132	59-140	20	20
	2,3,7,8-TCDD	200	20	75-126	60-141	20	20
	1,2,3,7,8-PeCDF	1000	100	74-131	64-140	20	20
	2,3,4,7,8-PeCDF	1000	100	62-137	61-141	20	20
	1,2,3,7,8-PeCDD	1000	100	82-124	65-140	20	20
	1,2,3,4,7,8-HxCDF	1000	100	84-124	66-137	20	20
	1,2,3,6,7,8-HxCDF	1000	100	75-128	60-138	20	20
	2,3,4,6,7,8-HxCDF	1000	100	71-146	65-148	20	20
	1,2,3,7,8,9-HxCDF	1000	100	73-144	59-146	20	20
	1,2,3,4,7,8-HxCDD	1000	100	70-135	52-152	20	20
	1,2,3,6,7,8-HxCDD	1000	100	76-127	62-138	20	20
	1,2,3,7,8,9-HxCDD	1000	100	66-142	58-147	20	20
	1,2,3,4,6,7,8-HpCDF	1000	100	74-131	64-138	20	20
	1,2,3,4,7,8,9-HpCDF	1000	100	73-135	58-145	20	20
	1,2,3,4,6,7,8-HpCDD	1000	100	82-124	65-137	20	20
	OCDF	2000	200	70-142	58-145	20	20
	OCDD	2000	200	82-128	64-143	20	20
(d)	^{13}C-2,3,7,8-TCDF	2000	200	40-135	40-135		
(d)	^{13}C-2,3,7,8-TCDD	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,7,8-PeCDF	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,7,8-PeCDD	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,4,7,8-HxCDF	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,6,7,8-HxCDD	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,4,6,7,8-HpCDF	2000	200	40-135	40-135		
(d)	^{13}C-1,2,3,4,6,7,8-HpCDD	2000	200	40-135	40-135		
(d)	^{13}C-OCDD	4000	400	40-135	40-135		

(c) Native compound limits are STL historical limits and are subject to change.
(d) Method default control limits. Signal-to-noise is also evaluated for data acceptability.

TABLE 4 SUMMARY OF CALIBRATION PROCEDURES
Method 8290 – STL, Sacramento

Method	Parameter	Calibration	Frequency	Acceptance Criteria	Corrective Action
SW8290 (GC/HRMS)	Dioxins/Furans	Tune using PFK.	Prior to sample analysis and at the end of the analytical sequence (no time limit for the ending PFK analysis).	Resolving power ≥10,000 at m/z=304.9824 & m/z=380.9760 ± 5 ppm of expected mass.	1) Retune instrument. 2) Reanalyze PFK. 3) End resolution acceptable "as is" – assess data for impact if resolution is less than 10,000 and narrate or reinject as necessary.
		Column Performance Check Solution (CPSM). Solution includes the Window Defining Mix.	Prior to 12 hrs of sample analysis.	Used to set retention times of first and last eluters. CPSM must have ≤25% valley resolution for 2,3,7,8-TCDD	1) Readjust windows. 2) Evaluate system. 3) Perform maintenance. 4) Reanalyze CPSM. 5) No corrective action is necessary if 2,3,7,8-TCDD is not detected and the % valley is greater than 25%.
		(5 point ICAL) Multipoint calibration.	Initially and as required.	1) Int. std. = %RSD<30% 2) Natives = %RSD<20% 3) Retention time must be within –1 to +3 seconds of labeled I.S. or 0.005 RRT units. 4) Ion ratios within Table 6 limits, and S/N ≥2.5	1) Evaluate system. 2) Recalibrate. 3) If all criteria are met except #4 (ratio), evaluate impact, narrate and report if no impact is found.
		Daily Continuing Calibration Verification standard (CCV).	Once per 12 hours, prior to sample analysis and at the end of the analytical sequence (no time limit for the ending CCV).	1) %D of I.S. ≤30% from avg. RRF (ICAL). (Ending %D of I.S. ≤35% from avg. RRF). 2) %D of natives ≤20% from avg. RRF (ICAL). (Ending %D of natives ≤25% from avg. RRF). 3) Retention time must be within –1 to +3 seconds of labeled I.S. or 0.005 RRT units. 4) Ion ratios within Table 6 limits, and S/N ≥2.5	1) Evaluate system. 2) Evaluate data for usability. 3) Reanalyze (CCAL). 4) Recalibrate (ICAL) as necessary. 5) Use "Ending Standard Decision Tree" if ending standard does not meet stated criteria.

TABLE 5 SUMMARY OF INTERNAL QUALITY CONTROL PROCEDURES
Method 8290 – STL, Sacramento

Method	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW8290 (GC/HRMS)	Dioxins/Furans	Internal Standards	Every sample, method blank, and LCS.	1) Internal standard recovery within limits stated in Tables 2 and 3.	1) Check chromatography for interferences. If found, flag data. 2) Check S/N. If < 10:1, re-extract sample. 3) If S/N > 10:1, evaluate data usability, flag, narrate and report. 4) Check instrument and re-analyze the extract if a problem is found and corrected. 5) Re-extract and re-analyze adversely affected samples.
		Method blank	1 per analytical batch, not to exceed 20 field samples per matrix.	If target analyte is detected above the lower calibration limit (Table 1) or reporting limit (CRQL). For OCDD 5X the LCL. [Note 1: a "J" value positive in the method blank, or OCDD <5 X the LCL requires no corrective action – flag and report.] [Note 2: "Totals" are not considered "target analytes" – no corrective action or flagging is necessary for positive totals in the method blank.]	1) Re-analyze method blank if instrument carryover is suspected. 2) If still exceeds and analyte concentration in sample < CRQL or > 10X blank concentration, narrate and report results. 3) If non-compliant and analyte concentration in sample is between CRQL and 10X blank concentration, re-extract and re-analyze affected samples.
		LCS (include natives)	At a frequency of 1 per 20 field samples extracted.	Refer to Table 3	1) Review Internal Standards, as above. 2) Evaluate data for usability. 3) If sample results are ND and CRQL are met, no action is required – narrate and report. 4) If samples have positives > CRQL, re-extract and re-analyze affected samples for analytes outside the acceptance criteria.
		Duplicates	As per client request.	Refer to Table 2 for internal standard RPD criteria.	1) Review Internal Standards as above. 2) If RPD exceeds, re-inject extract. 3) Narrate any outliers.
		Matrix Spike	As per client request.	Refer to Table 2 and 3.	1) Review data for usability. 2) Narrate outliers.
		Matrix Spike Duplicate	As per client request.	Refer to Table 2 and 3.	1) Review data for usability. 2) Narrate outliers.

TABLE 6 CRITERIA FOR ISOTOPIC RATIO MEASUREMENT FOR PCDDs AND PCDFs
Method 8290 – STL, Sacramento

Number of Chlorine Atoms	Ion Type	Theoretical Ratio	Control Limits (± 15%)
4	M/(M+2)	0.77	0.65-0.89
5	(M+2)/(M+4)	1.55	1.32-1.78
6	(M+2)/(M+4)	1.24	1.05-1.43
6[a]	M/(M+2)	0.51	0.43-0.59
7[b]	M/(M+2)	0.44	0.37-0.51
7	(M+2)/(M+4)	1.04	0.88-1.20
8	(M+2)/(M+4)	0.89	0.76-1.02

[a] Used only for ^{13}C-HxCDF (Internal Standard)
[b] Used only for ^{13}C-HpCDF (Internal Standard)

TABLE 7 PCDDs/PCDFs TOXICITY EQUIVALENCE FACTORS (TEF)
Method 8290 – STL, Sacramento

Analyte	TEF March 1989 (EPA 62/5-89/016)
2,3,7,8-TCDD	1.0
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.05
1,2,3,7,8-PeCDD	0.5
2,3,4,7,8-PeCDF	0.5
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,6,7,8-HpCDD	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDD	0.001
OCDF	0.001

ATTACHMENT B

CH2M HILL HEALTH AND SAFETY PLAN

CH2M HILL HEALTH AND SAFETY PLAN

This Health and Safety Plan (HSP) will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Site Safety Coordinator (SSC) is to be familiar with these SOPs and the contents of this plan. CH2M HILL's personnel and subcontractors must sign Attachment 1.

Project Information and Description

PROJECT NO: 138804.CI.FS

CLIENT: Saint Juliens Creek Annex

PROJECT/SITE NAME: Sites 3 and 6

SITE ADDRESS: Frederick Blvd. Chesapeake, Virginia

CH2M HILL PROJECT MANAGER: Friedmann, William

CH2M HILL OFFICE: Virginia Beach, Virginia Area Office

DATE HEALTH AND SAFETY PLAN PREPARED: 7/22/2002

DATE(S) OF SITE WORK: Potential Start Date August 15, 2002

SITE ACCESS: Main Gate (military pass required)

SITE SIZE: 2.7 acres

SITE TOPOGRAPHY: flat

PREVAILING WEATHER: hot and humid

SITE DESCRIPTION AND HISTORY: The Site 3 Disposal Area was originally a mudflat where refuse was dumped and allowed to burn; the ash was then used to fill in the area. The Site 3 Disposal Area was not lined. Operation began in 1940 and continued until 1970. After 1970, the area was graded level and covered with grass.

Site 6 was operated as part of the ordnance disposal operations at the Annex. It was located southwest of Site 3 and consisted of a caged metal container. No date of operation of the pit was found in the historical records. However, a review of historical aerial photographs indicated that activities associated with Site 6 began around 1974. According to the RFA report, small items, such as igniters and fuses, were burned in the pit (A.T. Kearney, 1989). The 1989 RFA also reported that the Navy had filled in the pit "during recent years". Interviews with former employees indicate that small items were transported into a steel container via a conveyor belt for destruction. The container was estimated to be 8-feet wide by 20-feet long by 12-feet high.

DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED: CH2MHill staff tasks include the collection of soil and sediment samples using hand auger/trowel to confirm proper excavation of contaminated soil/sediment.

Site Map

This page is reserved for a Site Map.

Note locations of Support, Decontamination, and Exclusion Zones; site telephone; first aid station; evacuation routes; and assembly areas.

Table of Contents

1 Tasks to be Performed Under this Plan

1.1 Description of Tasks

(Reference Field Project Start-up Form)

Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Section 1.2) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin. Refer to Section 8.2 for procedures related to "clean" tasks that do not involve hazardous waste operations and emergency response (Hazwoper).

1.1.1 Hazwoper-Regulated Tasks

- Observation of material loading for offsite disposal
- Oversight of remediation and construction
- Surface soil sampling
- Hand auguring

1.1.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

TASKS	CONTROLS
None anticipated	• Brief on hazards, limits of access, and emergency procedures • Post contaminant areas as appropriate (refer to Section 8.2 for details) • Sample and monitor as appropriate (refer to Section 5.0)

1.2 Task Hazard Analysis

(Refer to Section 2 for hazard controls)

POTENTIAL HAZARDS	TASKS									
	Test pit/ excavation	Drilling, geoprobe, and well installation & abandonment	Groundwater monitoring, aquifer testing	Surface water and sediment sampling using a boat	Surface water and sediment sampling from the shore or water	Hand augering	Surveying	IDW drum sampling and disposal	Observation of loading material for offsite disposal	Remediation & construction oversight
Flying debris/objects	X	X		X	X	X		X	X	X
Noise > 85dBA	X	X		X					X	X
Electrical	X	X	X	X						X
Suspended loads	X	X		X					X	X
Buried utilities, drums, tanks	X	X				X				X
Slip, trip, fall	X	X	X	X	X	X	X	X	X	X
Back injury	X	X	X	X	X	X		X		X
Confined space entry	X						X			X
Trenches / excavations	X									X
Visible lightning	X	X	X	X	X	X	X	X	X	X
Vehicle traffic									X	X
Elevated work areas/falls	X				X					X
Fires	X	X			X			X		X
Entanglement		X				X				
Drilling		X								
Heavy equipment	X	X		X					X	X
Working near water					X					
Working from boat				X						
IDW Drum Sampling								X		

2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SSC for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 6. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

Project-specific frequency for completing self-assessments: Initially and periodically during task, when applicable assessment checklists cover task (e.g., drilling, excavation).

2.1 Project-Specific Hazards

2.1.1 Earthmoving Equipment (Reference CH2M HILL SOP HS-27, *Earthmoving Equipment*)

- Only authorized personnel are permitted to operate earthmoving equipment.
- Maintain safe distance from operating equipment and stay alert of equipment movement. Avoid positioning between fixed objects and operating equipment and equipment pinch points, remain outside of the equipment swing and turning radius. Pay attention to backup alarms, but not rely on them for protection. Never turn your back on operating equipment.
- Approach operating equipment only after receiving the operator’s attention. The operator shall acknowledge your presence and stop movement of the equipment. Caution shall be used when standing next to idle equipment; when equipment is placed in gear it can lurch forward or backward. Never approach operating equipment from the side or rear where the operator’s vision is compromised.
- When required to work in proximity to operating equipment, wear high-visibility vests to increase visibility to equipment operators. For work performed after daylight hours, vests shall be made of reflective material or include a reflective stripe or panel.
- Do not ride on earthmoving equipment unless it is specifically designed to accommodate passengers. Only ride in seats that are provided for transportation and that are equipped with seat belts.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Earthmoving equipment shall not be used to lift or lower personnel.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment.

2.1.2 Excavation (Reference CH2M HILL SOP HS-32, *Excavations*)

- Do not enter the excavations unless completely necessary, and only after the competent person has completed the daily inspection and has authorized entry.
- Follow all excavation entry requirements established by the competent person.
- Do not enter excavations where protective systems are damaged or unstable.
- Do not enter excavations where objects or structures above the work location may become unstable and fall into the excavation.
- Do not enter excavations with the potential for a hazardous atmosphere until the air has been tested and found to be at safe levels.

- Do not enter excavations with accumulated water unless precautions have been taken to prevent excavation cave-in.
- H&S Self-Assessment Checklist – Excavations, found in Attachment 5 of this plan, should be used to evaluate excavations prior to entry.

2.2 General Hazards

2.2.1 General Practices and Housekeeping

(Reference CH2M HILL SOP HS-20, *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness require enough illumination intensity to read a newspaper without difficulty.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

2.2.2 Hazard Communication

(Reference CH2M HILL SOP HS-05, *Hazard Communication)*

The SSC is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using Attachment 2.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

2.2.3 Shipping and Transportation of Chemical Products

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods)*

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

2.2.4 Lifting

(Reference CH2M HILL SOP HS-29, *Lifting*)

- Proper lifting techniques must be used when lifting any object.
  - Plan storage and staging to minimize lifting or carrying distances.
  - Split heavy loads into smaller loads.
  - Use mechanical lifting aids whenever possible.
  - Have someone assist with the lift -- especially for heavy or awkward loads.
  - Make sure the path of travel is clear prior to the lift.

2.2.5 Fire Prevention

(Reference CH2M HILL SOP HS-22, *Fire Prevention*)

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must:
  - be maintained in a fully charged and operable condition,
  - be visually inspected each month, and
  - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

2.2.6 Electrical

(Reference CH2M HILL SOP HS-23, *Electrical*)

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
  - equipped with third-wire grounding.
  - covered, elevated, or protected from damage when passing through work areas.
  - protected from pinching if routed through doorways.
  - not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated UL approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

2.2.7 Stairways and Ladders

(Reference CH2M HILL SOP HS-25*, Stairways and Ladders*)

- Stairway or ladder is generally required when a break in elevation of 19 inches or greater exists.
- Personnel should avoid using both hands to carry objects while on stairways; if unavoidable, use extra precautions.
- Personnel must not use pan and skeleton metal stairs until permanent or temporary treads and landings are provided the full width and depth of each step and landing.
- Ladders must be inspected by a competent person for visible defects prior to each day’s use. Defective ladders must be tagged and removed from service.
- Ladders must be used only for the purpose for which they were designed and shall not be loaded beyond their rated capacity.
- Only one person at a time shall climb on or work from an individual ladder.

- User must face the ladder when climbing; keep belt buckle between side rails
- Ladders shall not be moved, shifted, or extended while in use.
- User must use both hands to climb; use rope to raise and lower equipment and materials
- Straight and extension ladders must be tied off to prevent displacement
- Ladders that may be displaced by work activities or traffic must be secured or barricaded
- Portable ladders must extend at least 3 feet above landing surface
- Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder
- Stepladders are to be used in the fully opened and locked position
- Users are not to stand on the top two steps of a stepladder; nor are users to sit on top or straddle a stepladder
- Fixed ladders $\geq$ 24 feet in height must be provided with fall protection devices.
- Fall protection should be considered when working from extension, straight, or fixed ladders greater than six feet from lower levels and both hands are needed to perform the work, or when reaching or working outside of the plane of ladder side rails.

2.2.8 Heat Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SSC/DSC to avoid progression of heat-related illness.

SYMPTOMS AND TREATMENT OF HEAT STRESS

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!

Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress.
The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

2.2.9 Cold Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.
- Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the SSC/DSC to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	**Frostbite**	**Hypothermia**
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

2.2.10 Compressed Gas Cylinders

- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured in an upright position at all times.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.

2.2.11 Procedures for Locating Buried Utilities

Local Utility Mark-Out Service

Name: *Clearing utilities will be the responsibility of the RAC contractor*
Phone:

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary (e.g., uncertainty about utility locations), excavation or drilling of the upper depth interval should be performed manually
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change n advancement of auger or split spoon).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the SSC should confirm that arrangement.

2.2.12 Confined Space Entry

(Reference CH2M HILL SOP HS-17, *Confined Space Entry*)

No confined space entry will be permitted. Confined space entry requires additional health and safety procedures, training, and a permit. If conditions change such that confined-space entry is necessary, contact the HSM to develop the required entry permit.
When planned activities will not include confined-space entry, permit-required confined spaces accessible to CH2M HILL personnel are to be identified before the task begins. The SSC is to confirm that permit spaces are properly posted or that employees are informed of their locations and hazards.

2.3 Biological Hazards and Controls

2.3.1 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

2.3.2 Poison Ivy and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

2.3.3 Ticks

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch in size. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray **only outside** of clothing with permethrin or permanone and spray skin with only DEET; and check yourself frequently for ticks.

If bitten by a tick, grasp it at the point of attachment and carefully remove it. After removing the tick, wash your hands and disinfect and press the bite areas. Save the removed tick. Report the bite to human resources. Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme: a rash might appear that looks like a bullseye with a small welt in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, seek medical attention.

2.3.4 Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SSC and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

2.3.5 Bloodborne Pathogens

(Reference CH2M HILL SOP HS-36, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

2.5 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Arsenic	SB:20.7	0.01 mg/m^3	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
Cadmium	SB:6.30	0.005 mg/m^3	9 Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA
Chromium (as Cr(II) & Cr(III))	SB:72.1	0.5 mg/m^3	25	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Lead	SB:2990	0.05 mg/m^3	100	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Mercury	SB:0.88	0.05 mg/m^3	10	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumontitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	

Footnotes:

[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), S (Surface Soil), SL (Sludge), SW (Surface Water).

[b] Appropriate value of PEL, REL, or TLV listed.

[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

2.6 Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.	**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.	**Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).

3 Project Organization and Personnel

3.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL SOPs HS-01, *Medical Surveillance,* and HS-02, *Health and Safety Training)*

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SSC/FA-CPR
William Friedmann	VBO	Project Manager/Field team lead	Level C SSC; FA-CPR
Daniel M. Holloway	VBO	Field team member	Level D SSC

3.2 Field Team Chain of Command and Communication Procedures

3.2.1 Client

Contact Name: Dawn Hayes
Phone: 757-322-4792
Facility Contact Name: Ms. Valerie Walker
Phone:757-887-4775

3.2.2 CH2M HILL

Project Manager: Friedmann, William
Health and Safety Manager: Longo, John
Field Team Leader: Friedmann, William
Site Safety Coordinator: Friedmann, William
The SSC is responsible for contacting the Field Team Leader and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted as appropriate.

3.2.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Subcontractor:NA
Subcontractor Contact Name:NA
Telephone:NA

The subcontractors listed above are covered by this HSP and must be provided a copy of this plan. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, excavation work, electrical). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. Subcontractors must comply with the established health and safety plan(s). The CH2M HILL SSC should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). CH2M HILL's oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SSC is responsible for confirming CH2M HILL subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Self-assessment checklists contained in Attachment 6 are to be used by the SSC to review subcontractor performance.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief the project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

3.2.4 Contractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Contractor: SHAW E&I
Contractor Contact Name: Taylor Sword
Telephone: 757-318-5142

This plan does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (e.g., advising on H&S issues). In addition to this plan, CH2M HILL staff should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Except in unusual situations when conducted by the HSM, CH2M HILL must never comment on or approve contractor safety procedures. Self-assessment checklists contained in Attachment 6 are to be used by the SSC to review the contractor's performance ONLY as it pertains to evaluating our exposure and safety.

Health and safety related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL employees and subcontractors on the precautions related to the contractor's work.
- When an apparent contractor non-compliance/unsafe condition or practice poses a risk to CH2M HILL employees or subcontractors:
  - Notify the contractor safety representative
  - Request that the contractor determine and implement corrective actions
  - If needed, stop affected CH2M HILL work until contractor corrects the condition or practice. Notify the client, Project Manager, and HSM as appropriate.
- If apparent contractor non-compliance/unsafe conditions or practices are observed, inform the contractor safety representative. Our obligation is limited strictly to informing the contractor of our observation – the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative. Our obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of our observation – the contractor is solely responsible for determining and implementing necessary controls and corrective actions.

- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

4 Personal Protective Equipment (PPE)

(Reference CH2M HILL SOP HS-07, *Personal Protective Equipment*, HS-08, *Respiratory Protection*)

PPE Specifications [a]

Task	Level	Body	Head	Respirator [b]
General site entry Surveying Observation of material loading for offsite disposal Oversight of remediation and construction	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat [c] Safety glasses Ear protection [d]	None required
Surface water sampling Aquifer testing Sediment sampling Surface soil sampling Hand augering Geoprobe boring	Modified D	Work clothes or cotton coveralls **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Safety glasses Ear protection [d]	None required
Groundwater sampling Soil boring Investigation-derived waste (drum) sampling and disposal	Modified D	**Coveralls:** Uncoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.
Test pit excavation Tasks requiring upgrade	C	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent[e].
Tasks requiring upgrade	B	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.
[b] No facial hair that would interfere with respirator fit is permitted.
[c] Hardhat and splash-shield areas are to be determined by the SSC.
[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.
[e] Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.
[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SSC qualified at that level is present.

5 Air Monitoring/Sampling

(Reference CH2M HILL SOP HS-06, *Air Monitoring)*

5.1 Air Monitoring Specifications

Instrument	Tasks	Action Levels[a]		Frequency [b]	Calibration
PID: OVM with 10.6eV lamp or equivalent	Intrusive tasks	0-1 ppm 1-5 ppm 5-500 ppm	Level D Level C Level B	Initially and periodically during task	Daily
Dust Monitor: Visual is adequate.	All	No visible Dust Visible dust	Level D Implement dust controls; Level C	NA	NA

[a] Action levels apply to sustained breathing-zone measurements above background.

[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).

5.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing
Dust Monitor: Miniram-PDM3	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter
CGI: MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL ± 5% LEL	1.5 lpm reg direct tubing

5.3 Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

Method Description

None required

6 Decontamination

(Reference CH2M HILL SOP HS-13, *Decontamination*)

The SSC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SSC. The SSC must ensure that procedures are established for disposing of materials generated on the site.

6.1 Decontamination Specifications

Personnel

- Boot wash/rinse
- Glove wash/rinse
- Outer-glove removal
- Body-suit removal
- Inner-glove removal
- Respirator removal
- Hand wash/rinse
- Face wash/rinse
- Shower ASAP
- Dispose of PPE in municipal trash, or contain for disposal
- Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal

Sample Equipment

- Wash/rinse equipment
- Solvent-rinse equipment
- Contain solvent waste for offsite disposal

Heavy Equipment

- Power wash
- Steam clean
- Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

6.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SSC should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 6-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SSC to accommodate task-specific requirements.

7 Spill-Containment Procedures

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly.

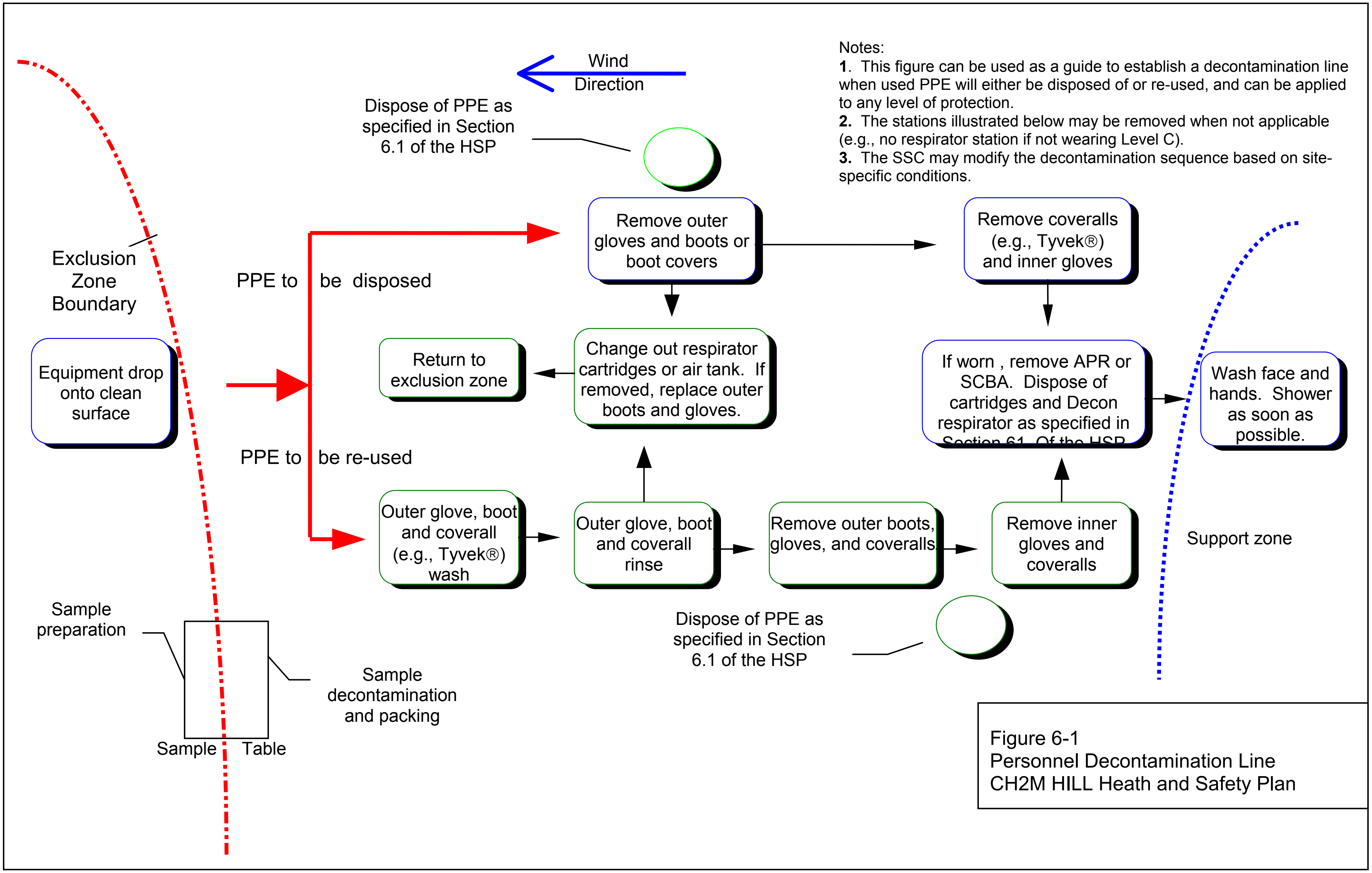

Figure 6-1
Personnel Decontamination Line
CH2M HILL Heath and Safety Plan

8 Site-Control Plan

8.1 Site-Control Procedures

(Reference CH2M HILL SOP HS-11, *Site Control)*

- The SSC will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SSC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with CH2M HILL SOP HS-71, *OSHA Postings*.
- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the "buddy system."
- Initial air monitoring is conducted by the SSC in appropriate level of protection.
- The SCC is to conduct periodic inspections of work practices to determine the effectiveness of this plan – refer to Sections 2 and 3. Deficiencies are to be noted, reported to the HSM, and corrected.

8.2 Hazwoper Compliance Plan

(Reference CH2M HILL SOP HS-19, *Site-Specific Written Safety Plans)*

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks (Section 1.1.1) might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities specified in Section 1.1.2 do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site, or while non-Hazwoper-trained staff are working in proximity to Hazwoper activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to subsections 2.5 and 5.3 for contaminant data and air sampling requirements, respectively.
- When non-Hazwoper-trained personnel are at risk of exposure, the SSC must post the exclusion zone and inform non-Hazwoper-trained personnel of the:
  - nature of the existing contamination and its locations
  - limitations of their access
  - emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.
- Remediation treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the Hazwoper standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hour of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must not enter the TSDF area of the site.

9 Emergency Response Plan

(Reference CH2M HILL, SOP HS-12, *Emergency Response*)

9.1 Pre-Emergency Planning

The SSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.

The SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

9.2 Emergency Equipment and Supplies

The SSC should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
20 LB (or two 10-lb) fire extinguisher (A, B, and C classes)	Support Zone/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye Wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle
Bloodborne-pathogen kit	Support Zone/Field Vehicle

9.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate work area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

9.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities listed in Section 9.8 (e.g., 911).
- The SCC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 9.7.

9.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the SSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SSC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The SSC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The SSC will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

9.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

9.7 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact and help Human Resources administrator complete an Incident Report Form (IRF). IRF must be completed within 24 hours of incident.
- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to client as required in contract.

10 Approval

This site-specific Health and Safety Plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

10.1 Original Plan

Written By: Dan Holloway/VBO **Date:** 7/22/2002

Approved By: John Longo/NJO **Date:** 7/26/2002

10.2 Revisions

Revisions Made By: **Date:**

Revisions to Plan:

Revisions Approved By: **Date:**

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11 Attachments

Attachment 1: **Employee Signoff Form – Field Safety Instructions**
Attachment 2: **Project-Specific Chemical Product Hazard Communication Form**
Attachment 3: **Chemical-Specific Training Form**
Attachment 4: **Emergency Contacts**
Attachment 5: **Project H&S Forms/Permits**
Attachment 6: **Project Activity Self-Assessment Checklists**
Attachment 7: **Applicable Material Safety Data Sheets**

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

- The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: Sites 3 and 6	**Project Number:** 138804.CI.FS

EMPLOYEE NAME (Please print)	**EMPLOYEE SIGNATURE**	**COMPANY**	**DATE**

Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the SSC shall verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to CH2M HILL and subcontractor personnel. Labeling and MSDS systems will also be explained.

Project Name: Sites 3 and 6 **Project Number:** 138804.CI.FS

MSDSs will be maintained at the following location(s): Virginia Beach Office, and with the Field team on site

Hazardous Chemical Products Inventory

Chemical	Quantity	Location	MSDS Available	Container labels	
				Identity	Hazard
Methane	1 liter, compressed	Support Zone			
Isobutylene	1 liter, compressed	Support Zone			
Pentane	1 liter, compressed	Support Zone			
Hydrochloric acid	< 500 ml	Support Zone / sample bottles			
Nitric acid	< 500 ml	Support Zone / sample bottles			
Sulfuric Acid	< 500 ml	Support Zone / sample bottles			
Sodium hydroxide	< 500 ml	Support Zone / sample bottles			
Methanol	< 1 Gallon	Support/Decon Zones	yes		
pH buffers	< 500 ml	Support Zone			

Refer to SOP HS-05 *Hazard Communication* for more detailed information.

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Location:	Project # : 138804.CI.FS
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

Emergency Contacts

24-hour CH2M HILL Emergency Beeper – 888/444-1226

Medical Emergency – 911 Facility Medical Response #: 757-396-3333 Local Ambulance #: 757-396-3333	**CH2M HILL Medical Consultant** Dr. Peter Greaney GMG WorkCare, Orange, CA 800/455-6155 (After hours calls will be returned within 20 minutes)
Fire/Spill Emergency -- 911 Facility Fire Response #: 757-396-3335 Local Fire Dept #: 757-382-6297	**Utilities Emergency** Water: 757-382-3550 Gas: 1-877-572-3342 Electric: 1-888-667-3000
Security & Police – 911 Facility Security #: 757-396-5111 Local Police #: 757-382-6161	**Corporate Director Health and Safety** Name: Dave McCormack/SEA Phone: 206/453-5005 **24-hour emergency beeper: 888-444-1226**
Designated Safety Coordinator (DSC) Name: William Friedmann Phone: 757-460-3734x19	**Health and Safety Manager (HSM)** Name: John Longo Phone: 973-316-9300x4543
Project Manager Name: William Friedmann Phone: 757-460-3734x19	**Regional Human Resources Department** Name: Cindy Bauder Phone: 703-471-1508
Federal Express Dangerous Goods Shipping Phone: 800/238-5355 **CH2M HILL Emergency Number for Shipping Dangerous Goods** Phone: 800/255-3924	**Worker's Compensation and Auto Claims** Sterling Administration Services Phone: 800/420-8926 After hours: 800/497-4566 Report fatalities AND report vehicular accidents involving pedestrians, motorcycles, or more than two cars.

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: **Evacuation Assembly Area(s):**

Facility/Site Evacuation Route(s):

Hospital Name/Address: Mayview Hospital/Oakley Street **Hospital Phone #:** 757-398-2200

Directions to Hospital

Leave the main gate of the Annex and take a left onto Victory Blvd. At Route 17 (George Wash. Hwy) take a right and go north. Make left onto Frederick Blvd. and continue until it dead-ends. Make a left onto High Street, the hospital is on the right at the first light.

Project H&S Forms and Permits

Project Activity Self-Assessment Checklists

H&S Self-Assessment Checklist - EXCAVATIONS

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees enter excavations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of an excavation subcontractor is required (complete entire checklist).

SSC/DSC may consult with excavation subcontractors when completing this checklist, but shall not direct the means and methods of excavation operations nor direct the details of corrective actions. Excavation subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the health and safety manager for review.

Project Name: ______________________ Project No.: ______________

Location: ______________________ PM: ______________

Auditor: ______________ Title: ______________ Date: ________

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to excavation hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with excavation H&S requirements
Subcontractors Name: ______________________

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the excavation subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-32.

SECTION 1

PERSONNEL SAFE WORK PRACTICES (3.1)

	Item	Yes	No	N/A	N/O
1.	Competent person has completed daily inspection and has authorized entry	☐	☐	☐	☐
2.	Personnel aware of entry requirements established by competent person	☐	☐	☐	☐
3.	Protective systems are free from damage and in stable condition	☐	☐	☐	☐
4.	Surface objects/structures secured from falling into excavation	☐	☐	☐	☐
5.	Potential hazardous atmospheres have been tested and found to be at safe levels	☐	☐	☐	☐
6.	Precautions have been taken to prevent cave-in from water accumulation in the excavation	☐	☐	☐	☐
7.	Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

SECTION 2	Yes	No	N/A	N/O
GENERAL (3.2.1)				
8. Daily safety briefing/meeting conducted with personnel	☐	☐	☐	☐
9. Excavation and protective systems adequately inspected by competent person	☐	☐	☐	☐
10. Defective protective systems or other unsafe conditions corrected before entry	☐	☐	☐	☐
11. Guardrails provided on walkways over excavation 6' or deeper	☐	☐	☐	☐
12. Barriers provided at excavations 6' or deeper when not readily visible	☐	☐	☐	☐
13. Barriers or covers provided for wells, pits, shafts, or similar excavation 6' or deeper	☐	☐	☐	☐
14. Excavating equipment operated safely (use earthmoving equipment checklist in HS-27)	☐	☐	☐	☐
PRIOR TO EXCAVATING (3.2.2)				
15. Location of underground utilities and installations identified	☐	☐	☐	☐
EXCAVATING ACTIVITIES (3.2.3)				
16. Rocks, trees, and other unstable surface objects removed or supported	☐	☐	☐	☐
17. Exposed underground utility lines supported	☐	☐	☐	☐
18. Undermined surface structures supported or determined to be in safe condition	☐	☐	☐	☐
19. Warning system used to remind equipment operators of excavation edge	☐	☐	☐	☐
EXCAVATION ENTRY (3.2.4)				
20. Trenches > 4' deep provided with safe means of egress within 25'	☐	☐	☐	☐
21. Structure ramps designed and approved by competent person	☐	☐	☐	☐
22. Potential hazardous atmospheres tested prior to entry	☐	☐	☐	☐
23. Rescue equipment provided where potential for hazardous atmospheres exists	☐	☐	☐	☐
24. Ventilation used to control hazardous atmospheres and air tested frequently	☐	☐	☐	☐
25. Appropriate respiratory protection used when ventilation does not control hazards	☐	☐	☐	☐
26. Precautions taken to prevent cave-in from water accumulation in the excavation	☐	☐	☐	☐
27. Precautions taken to prevent surface water from entering excavation	☐	☐	☐	☐
28. Protection provided from falling/rolling material from excavation face	☐	☐	☐	☐
29. Spoil piles, equipment, materials restrained or kept at least 2' from excavation edge	☐	☐	☐	☐
EXCAVATION PROTECTIVE SYSTEMS (3.2.5)				
30. Protective systems used for excavations 5' or deeper	☐	☐	☐	☐
31. Protective systems for excavation deeper than 20' designed by registered PE	☐	☐	☐	☐
32. If soil unclassified, maximum allowable slope is 34 degrees	☐	☐	☐	☐
33. Protective systems free from damage	☐	☐	☐	☐
34. Protective system used according to manufacturer recommendations and not subjected to loads exceeding design limits	☐	☐	☐	☐
35. Protective system components securely connected to prevent movement or failure	☐	☐	☐	☐
36. Cave-in protection provided while entering/exiting shielding systems	☐	☐	☐	☐
37. Personnel removed from shielding systems when installed, removed, or vertical movement	☐	☐	☐	☐
PROTECTIVE SYSTEM REMOVAL (3.2.6)				
38. Protective system removal starts and progresses from excavation bottom	☐	☐	☐	☐
39. Protective systems removed slowly and cautiously	☐	☐	☐	☐
40. Temporary structure supports used if failure of remaining components observed	☐	☐	☐	☐
41. Backfilling taking place immediately after protective system removal	☐	☐	☐	☐
EXCAVATING AT HAZARDOUS WASTE SITES (3.2.7)				
42. Waste disposed of according to HSP	☐	☐	☐	☐
43. Appropriate decontamination procedures being followed, per HSP	☐	☐	☐	☐

CH2MHILL

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are potentially exposed to hazards associated with earthmoving equipment.

DSC may consult with earthmoving equipment contractors when completing this checklist, but shall not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment contractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: ______________________________ Project No.: ______________

Location: ______________________________ PM: ______________

Auditor: ______________ Title: ______________ Date: ________

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to earthmoving equipment hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with earthmoving equipment H&S requirements
Subcontractors Name: ______________________________

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-27.

SECTION 1	Yes	No	N/A	N/O
PERSONNEL SAFE WORK PRACTICES (3.1)				
1. Only authorized personnel operating earthmoving equipment	☐	☐	☐	☐
2. Personnel maintaining safe distance from operating equipment	☐	☐	☐	☐
3. Personnel and equipment operator in close communication when personnel must be in proximity of operating equipment	☐	☐	☐	☐
4. Personnel approach operating equipment safely	☐	☐	☐	☐
5. Personnel wearing high-visibility and/or reflective vests when close to operating equipment	☐	☐	☐	☐
6. Personnel riding only in seats of equipment cab and using seat belts	☐	☐	☐	☐
7. Personnel not positioned under hoisted loads	☐	☐	☐	☐
8. Personnel not hoisted by equipment	☐	☐	☐	☐
1. Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐
10. Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

Rev.0

SECTION 1	Yes	No	N/A	N/O
GENERAL (3.2.1)				
11. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
12. Daily inspection of equipment and equipment accessories conducted before use	☐	☐	☐	☐
13. At least one fire extinguisher available at the equipment operating area	☐	☐	☐	☐
EARTHMOVING EQUIPMENT COMPONENTS (3.2.2)				
14. Backup alarm or spotter used when backing equipment	☐	☐	☐	☐
15. Operational horn provided on bi-directional equipment	☐	☐	☐	☐
16. Safe clearance distance maintained while working under overhead powerlines	☐	☐	☐	☐
17. Safe distance is maintained while traveling under powerlines	☐	☐	☐	☐

SECTION 2

Complete this section for all items checked "No" in Section 1. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Rev.0

CompuChem Method Detection Limit Study

Study Date: January 18, 2001				GCMS Method 3510C/8270C Aqueous Semivolatiles									
Instrument: 5972hp64													
Compound Name	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	Std.Dev.	MDL	Report Limit
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
n-Nitrosodimethylamine	2.02	1.60	1.50	1.88	1.75	0.97	1.30	1.33	1.62	1.55	5.0	0.32	0.93	10
Pyridine	0.60	0.54	*	*	0.62	0.73	0.32	0.55	0.49	0.55	5.0	0.13	0.40	10
Benzaldehyde	5.07	4.64	4.33	5.11	4.09	3.51	3.79	3.96	3.79	4.25	5.0	0.58	1.7	10
Phenol	1.71	1.46	2.04	2.46	1.63	1.24	1.41	1.32	1.23	1.61	5.0	0.41	1.2	10
Bis(2-chloroethyl)ether	3.33	3.07	2.73	3.04	2.92	2.31	2.81	2.57	2.49	2.81	5.0	0.32	0.93	10
2-Chlorophenol	3.26	2.78	2.65	3.04	2.90	2.25	2.46	2.41	2.30	2.67	5.0	0.35	1.0	10
1,3-Dichlorobenzene	3.00	3.01	2.53	2.93	2.63	2.15	2.19	2.10	2.21	2.53	5.0	0.38	1.1	10
1,4-Dichlorobenzene	3.07	2.79	2.63	2.90	2.58	2.12	2.29	2.30	2.25	2.55	5.0	0.33	0.95	10
Benzyl alcohol	2.48	2.53	2.07	2.28	2.19	1.99	2.12	2.17	1.87	2.19	5.0	0.22	0.62	10
1,2-Dichlorobenzene	3.10	2.80	2.47	2.77	2.43	2.19	2.26	2.20	2.16	2.49	5.0	0.33	0.96	10
2-Methylphenol	3.00	2.78	2.55	2.98	2.71	2.24	2.32	2.34	2.17	2.57	5.0	0.32	0.92	10
2,2'-oxybis(1-Chloropropane)	3.64	3.49	3.14	3.58	3.31	2.76	3.09	2.83	2.97	3.20	5.0	0.32	0.93	10
Acetophenone	3.58	3.15	2.94	3.26	3.13	2.60	3.07	2.69	2.86	3.03	5.0	0.30	0.87	10
3,4-Methylphenol	2.38	2.43	2.53	2.87	2.29	2.16	2.24	1.98	1.81	2.30	5.0	0.31	0.90	10
n-Nitroso-di-n-propylamine	2.84	2.93	2.61	2.72	2.54	2.23	2.63	2.24	2.24	2.55	5.0	0.27	0.77	10
Hexachloroethane	3.51	2.92	2.63	3.06	2.89	2.15	2.37	2.08	2.25	2.65	5.0	0.48	1.4	10
Nitrobenzene	3.72	3.40	3.21	3.68	3.30	2.69	2.91	2.96	3.05	3.21	5.0	0.35	1.0	10
Isophorone	3.26	3.26	3.04	3.23	3.04	2.72	2.90	2.75	2.71	2.99	5.0	0.23	0.67	10
2-Nitrophenol	2.60	2.37	2.04	2.38	2.37	1.78	2.05	1.98	1.97	2.17	5.0	0.27	0.77	10
2,4-Dimethylphenol	2.32	3.32	2.77	3.24	3.04	2.36	2.59	2.68	1.59	2.66	5.0	0.53	1.5	10
Bis(2-chloroethoxy)methane	3.75	3.76	3.35	3.55	3.48	2.99	3.27	3.07	3.24	3.38	5.0	0.27	0.79	10
2,4-Dichlorophenol	2.72	2.61	2.31	2.79	2.49	2.08	2.39	2.34	2.16	2.43	5.0	0.24	0.70	10
1,2,4-Trichlorobenzene	3.60	3.17	2.81	3.02	2.92	2.30	2.57	2.41	2.62	2.82	5.0	0.41	1.2	10
Naphthalene	3.21	2.89	2.67	2.90	2.83	2.30	2.46	2.35	2.40	2.67	5.0	0.31	0.90	10
4-Chloroaniline	2.92	3.07	1.73	1.26	2.51	2.55	2.54	2.47	2.37	2.38	5.0	0.56	1.6	10
Hexachlorobutadiene	3.46	3.05	2.68	2.84	2.69	2.24	2.42	2.38	2.44	2.69	5.0	0.38	1.1	10
Caprolactam	0.25	0.39	0.16	*	0.42	0.37	0.31	0.62	0.23	0.34	5.0	0.14	0.43	10
4-Chloro-3-methylphenol	3.08	2.96	2.86	2.94	2.87	2.67	2.64	2.55	2.69	2.81	5.0	0.18	0.51	10
2-Methylnaphthalene	4.61	4.35	4.16	4.29	4.17	3.64	3.84	3.81	3.79	4.07	5.0	0.32	0.93	10
1-Methylnaphthalene*	3.38	3.84	4.18	4.21	3.99	3.37	4.44	4.00	4.23	3.96	5.0	0.37	1.1	10
Hexachlorocyclopentadiene	1.47	1.48	1.16	1.42	1.08	1.11	1.26	0.30	1.26	1.17	10.0	0.36	1.0	10

Reporting Limit = Low Level Standard
*MDL to be repeated

CompuChem Method Detection Limit Study

Study Date: January 18, 2001				GCMS Method 3510C/8270C Aqueous Semivolatiles									
Instrument: 5972hp64													
Compound Name	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	Std.Dev.	MDL	Report Limit
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
2,4,6-Trichlorophenol	6.57	7.36	6.15	6.77	6.05	5.47	5.87	5.48	5.43	6.13	10.0	0.67	1.9	10
2,4,5-Trichlorophenol	6.49	6.56	6.09	6.69	5.91	5.77	5.38	5.33	5.70	5.99	10.0	0.50	1.5	10
1,1'-Biphenyl	3.57	3.57	3.21	3.49	3.31	2.85	2.96	2.89	2.79	3.18	5.0	0.32	0.92	10
2-Chloronaphthalene	3.09	3.26	2.81	3.17	2.91	2.57	2.73	2.69	2.58	2.87	5.0	0.26	0.74	10
2-Nitroaniline	2.76	2.86	2.43	2.70	2.70	2.63	2.43	2.44	2.52	2.61	5.0	0.16	0.46	20
Dimethylphthalate	3.45	3.81	3.47	3.45	3.36	3.16	3.18	3.27	3.38	3.39	5.0	0.19	0.56	10
2,6-Dinitrotoluene	2.77	2.93	2.31	2.74	2.39	2.34	2.53	2.20	2.34	2.51	5.0	0.25	0.73	10
Acenaphthylene	3.28	3.40	2.90	3.04	2.92	2.72	2.79	2.70	2.79	2.95	5.0	0.25	0.72	10
3-Nitroaniline	5.03	5.85	5.15	4.96	4.77	4.74	4.67	4.68	4.82	4.96	10.0	0.37	1.1	20
Acenaphthene	3.23	3.33	2.94	3.11	2.99	2.82	2.81	2.81	2.95	3.00	5.0	0.19	0.55	10
2,4-Dinitrophenol	6.46	8.50	5.05	7.41	7.56	7.39	8.36	6.40	5.37	6.94	50.0	1.22	3.5	50
4-Nitrophenol	2.57	3.17	4.25	5.05	2.74	2.86	2.48	2.55	2.15	3.09	20.0	0.95	2.7	20
2,4-Dinitrotoluene	2.25	2.73	2.39	2.42	2.32	2.32	2.37	2.29	2.23	2.37	5.0	0.15	0.43	10
Dibenzofuran	3.59	3.62	3.26	3.57	3.40	3.10	3.15	3.06	3.13	3.32	5.0	0.23	0.66	10
Diethylphthalate	3.44	3.75	3.31	3.40	3.33	3.15	3.23	3.09	3.16	3.32	5.0	0.20	0.58	10
4-Chlorophenyl-phenylether	3.33	3.45	3.13	3.18	3.16	2.89	2.94	2.86	2.90	3.09	5.0	0.21	0.61	10
Fluorene	2.87	3.01	2.62	2.79	2.62	2.49	2.55	2.44	2.52	2.66	5.0	0.19	0.56	10
4-Nitroaniline	4.37	4.99	4.38	4.37	4.12	4.19	4.36	4.32	4.11	4.36	10.0	0.26	0.76	20
4,6-Dinitro-2-methylphenol	2.78	3.27	2.65	3.12	2.60	3.03	3.18	2.75	2.40	2.86	10.0	0.30	0.86	20
n-Nitrosodiphenylamine	3.47	3.64	3.15	3.31	3.08	2.96	2.98	3.09	2.92	3.18	5.0	0.25	0.71	10
1,2-Diphenylhydrazine*	4.91	6.41	5.94	6.81	6.02	4.97	6.84	5.76	6.33	6.00	5.0	0.70	2.0	10
4-Bromophenyl phenylether	3.36	3.60	2.97	3.55	3.16	3.07	3.01	2.84	2.82	3.15	5.0	0.29	0.84	10
Hexachlorobenzene	3.63	3.97	3.73	3.76	3.43	3.28	3.28	3.33	3.28	3.52	5.0	0.26	0.75	10
Atrazine	5.43	5.58	5.41	5.56	5.42	5.40	5.39	5.59	5.33	5.46	5.0	0.09	0.27	10
Pentachlorophenol	4.68	5.45	4.84	4.90	4.21	4.58	4.38	4.56	4.05	4.63	10.0	0.41	1.2	20
Phenanthrene	3.43	3.48	3.05	3.34	3.07	2.96	2.92	2.91	2.93	3.12	5.0	0.23	0.67	10
Anthracene	3.17	3.39	3.05	3.08	2.92	2.77	2.80	2.85	2.78	2.98	5.0	0.21	0.61	10
Carbazole	3.82	4.29	3.67	3.76	3.56	3.66	3.43	3.61	3.36	3.68	5.0	0.27	0.78	10
Di-n-butylphthalate	3.41	4.03	3.32	3.37	3.17	3.21	3.15	3.30	3.13	3.34	5.0	0.28	0.80	10
Fluoranthene	3.14	3.67	3.08	3.31	2.94	3.02	2.94	3.03	2.92	3.12	5.0	0.24	0.70	10
Benzidine*	0.64	1.19	1.05	1.34	0.99	0.66	0.86	0.43	0.69	0.87	100	0.29	0.85	20

Reporting Limit = Low Level Standard
*MDL to be repeated

CompuChem Method Detection Limit Study

Study Date: January 18, 2001				GCMS Method 3510C/8270C Aqueous Semivolatiles									
Instrument: 5972hp64													
Compound Name	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	Std.Dev.	MDL	Report Limit
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Pyrene	3.07	3.08	3.00	3.03	3.02	2.56	2.59	2.80	2.81	2.88	5.0	0.20	0.59	10
Butylbenzylphthalate	3.12	3.27	2.93	3.03	2.89	2.76	2.70	2.86	2.82	2.93	5.0	0.18	0.52	10
3,3'-Dichlorobenzidine	3.33	3.48	2.30	2.32	2.59	2.81	2.39	2.61	2.48	2.70	5.0	0.43	1.2	10
bis(2-ethylhexyl)phthalate	3.32	3.56	3.19	*	3.19	3.05	2.87	3.14	2.94	3.16	5.0	0.22	0.65	10
Benzo(a)anthracene	2.92	3.15	2.82	2.94	2.83	2.73	2.67	2.70	2.68	2.83	5.0	0.16	0.46	10
Chrysene	3.60	3.47	3.31	3.30	3.19	3.10	2.83	3.17	3.09	3.23	5.0	0.23	0.65	10
Di-n-octylphthalate	2.47	2.89	2.50	2.51	2.24	2.40	2.34	2.32	2.03	2.41	5.0	0.23	0.68	10
Benzo(b)fluoranthene	2.30	2.58	2.33	2.21	2.04	2.17	2.16	2.19	1.98	2.22	5.0	0.18	0.51	10
Benzo(k)fluoranthene	3.61	3.66	3.22	3.67	3.56	3.16	2.98	3.22	3.52	3.40	5.0	0.26	0.74	10
Benzo(a)pyrene	2.53	2.80	2.39	2.58	2.27	2.19	2.29	2.32	2.22	2.40	5.0	0.20	0.58	10
Indeno(1,2,3-c,d)pyrene	2.09	2.16	1.83	2.26	1.68	1.47	1.53	1.68	1.58	1.81	5.0	0.29	0.85	10
Dibenzo(a,h)anthracene	2.19	2.16	1.74	2.32	1.76	1.57	1.59	1.74	1.81	1.88	5.0	0.28	0.80	10
Benzo(g,h,i)perylene	2.61	2.57	2.21	2.66	2.19	1.93	1.91	2.00	2.26	2.26	5.0	0.29	0.85	10

Reporting Limit = Low Level Standard
*MDL to be repeated

CompuChem Method Detection Limit Study

Study Date: February 22, 2001			GCMS Method 3540C/8270C Solid Matrix, TCL and PPL Compounds											
Instrument: 5972HP60														
Compound Name	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	S.Dev.	MDL	Report Limit
	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
n-Nitrosodimethylamine	297.3	281.2	244.2	205.8	288.5	317.5	227.3	285.1	253.4	266.7	167	36.2	105	330
Pyridine	71.90	168.1	113.2	100.6	180.2	125.3	78.42	69.37	82.66	110.0	167	41.1	119	330
Benzaldehyde	169.8	*	40.43	121.0	*	105.3	53.90	179.5	121.6	113.1	167	52.6	165	330
Phenol	420.9	429.7	364.2	367.9	466.8	438.0	422.3	474.2	399.6	420.4	167	38.4	111	330
Bis(2-chloroethyl)ether	423.7	354.6	364.3	368.1	417.5	398.8	396.0	396.8	385.2	389.4	167	23.6	68.4	330
2-Chlorophenol	413.2	393.2	375.6	338.4	396.2	392.0	456.8	421.2	365.0	394.6	167	34.1	98.9	330
1,3-Dichlorobenzene	428.8	392.9	339.2	335.0	362.0	398.8	422.3	461.3	358.6	388.8	167	43.4	126	330
1,4-Dichlorobenzene	398.7	376.4	319.8	330.1	372.6	402.9	397.1	402.4	343.4	371.5	167	32.7	94.6	330
Benzyl alcohol	352.5	313.4	314.1	334.2	350.1	274.6	343.8	352.3	298.0	325.9	167	27.6	79.9	330
1,2-Dichlorobenzene	389.7	403.8	370.1	352.1	394.1	376.9	399.6	444.0	366.3	388.5	167	26.8	77.7	330
2-Methylphenol	366.4	377.4	307.8	309.3	333.3	365.9	333.5	365.8	366.8	347.3	167	26.8	77.5	330
2,2'-oxybis(1-Chloropropane)	497.0	474.2	432.7	479.3	534.8	513.5	491.0	569.3	501.1	499.2	167	38.6	112	330
Acetophenone	444.5	397.3	402.9	371.4	451.4	420.5	445.3	429.6	378.6	415.7	167	29.7	85.9	330
3,4-Methylphenol	321.3	286.1	312.3	273.3	352.1	313.7	276.5	332.1	295.7	307.0	167	26.4	76.4	330
n-Nitroso-di-n-propylamine	335.4	345.1	286.5	277.6	334.6	343.0	340.2	356.5	267.3	320.7	167	33.6	97.4	330
Hexachloroethane	441.8	400.3	358.0	345.8	420.9	417.9	410.7	447.5	354.1	399.7	167	38.2	111	330
Nitrobenzene	466.5	525.7	455.1	447.1	508.1	493.9	479.5	573.8	462.6	490.3	167	40.5	117	330
Isophorone	425.7	446.8	403.4	431.3	455.1	437.2	425.7	456.5	416.9	433.2	167	17.6	51.1	330
2-Nitrophenol	405.6	355.8	347.7	330.6	381.1	417.6	414.6	392.9	395.7	382.4	167	31.0	89.8	330
2,4-Dimethylphenol	135.9	127.1	105.4	126.2	95.31	111.0	49.41	55.24	112.7	102.0	167	30.8	89.1	330
Bis(2-chloroethoxy)methane	442.4	409.3	362.9	356.9	423.3	431.5	418.8	401.7	367.9	401.6	167	31.6	91.6	330
2,4-Dichlorophenol	425.7	434.7	368.6	416.4	414.0	403.8	392.1	437.3	365.3	406.4	167	26.5	76.7	330
1,2,4-Trichlorobenzene	419.7	428.6	401.3	372.1	420.8	426.2	444.0	444.0	384.0	415.6	167	25.1	72.6	330
Naphthalene	437.2	429.8	384.8	378.1	431.3	400.0	445.2	445.1	394.6	416.2	167	26.7	77.3	330
4-Chloroaniline	321.5	374.7	319.0	328.9	362.3	355.4	340.8	375.7	353.4	347.9	167	21.6	62.6	330
Hexachlorobutadiene	414.8	413.7	365.6	380.9	402.7	408.6	426.8	458.9	399.8	408.0	167	26.6	77.0	330
Caprolactam	395.5	373.9	428.8	344.3	402.7	390.5	402.0	312.7	390.8	382.3	167	34.7	101	330
4-Chloro-3-methylphenol	397.9	459.8	400.6	423.2	446.1	447.0	428.1	432.5	379.9	423.9	167	26.4	76.4	330
2-Methylnaphthalene	375.0	383.4	354.4	381.7	397.1	383.4	381.4	409.3	355.7	380.1	167	17.5	50.7	330
1-Methylnaphthalene	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	167	TBD	TBD	330
Hexachlorocyclopentadiene	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	333	TBD	TBD	330

Reporting Limit = Low Level Standard

CompuChem Method Detection Limit Study

Study Date: February 22, 2001			GCMS Method 3540C/8270C Solid Matrix, TCL and PPL Compounds										
Instrument: 5972HP60													
Compound Name	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	S.Dev.	MDL	Report Limit
	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
2,4,6-Trichlorophenol	893.2	876.0	857.1	856.7	906.5	859.8	873.1	876.7	798.3	866.4	333	30.5	88.3	330
2,4,5-Trichlorophenol	959.2	963.3	846.8	883.1	965.1	882.4	837.5	890.8	829.1	895.3	333	54.8	159	330
1,1'-Biphenyl	453.7	491.8	431.1	461.6	483.0	470.3	437.9	481.2	422.9	459.3	167	24.6	71.1	330
2-Chloronaphthalene	431.2	457.1	398.3	415.7	458.6	423.7	411.4	414.1	407.0	424.1	167	21.3	61.6	330
2-Nitroaniline	411.5	469.8	427.1	424.4	464.9	444.2	434.7	450.2	371.6	433.2	167	29.9	86.5	330
Dimethylphthalate	411.3	465.2	411.3	428.3	434.1	431.8	411.6	430.6	424.3	427.6	167	16.9	48.9	330
2,6-Dinitrotoluene	378.0	426.3	386.7	401.7	410.5	402.2	440.8	406.3	397.4	405.5	167	19.1	55.2	330
Acenaphthylene	394.1	430.2	373.1	410.5	424.4	395.7	405.1	403.2	375.7	401.3	167	19.4	56.1	330
3-Nitroaniline	781.0	899.6	791.9	816.5	863.0	807.7	810.5	808.4	789.5	818.7	333	38.4	111	660
Acenaphthene	414.1	449.8	391.9	402.4	446.8	404.7	435.8	412.3	379.7	415.3	167	24.2	70.2	330
2,4-Dinitrophenol	3410	3592	3605	3576	3605	3553	3512	3339	3104	3477	1670	167.9	486	1600
4-Nitrophenol	1832	2154	1789	1841	2103	1857	1912	1811	1906	1912	666	130.0	376	660
2,4-Dinitrotoluene	429.6	490.9	451.0	463.4	455.5	427.0	451.4	459.1	442.6	452.3	167	19.1	55.3	330
Dibenzofuran	392.7	415.4	361.0	385.4	400.8	401.7	391.6	374.7	370.4	388.2	167	17.2	49.7	330
Diethylphthalate	440.3	499.5	440.2	460.8	481.3	444.8	430.4	433.6	420.0	450.1	167	25.8	74.7	330
4-Chlorophenyl-phenylether	401.6	440.5	383.5	408.6	407.8	409.6	420.1	418.9	377.2	407.5	167	19.1	55.3	330
Fluorene	406.2	420.9	396.3	410.7	434.2	409.1	394.0	395.3	388.1	406.1	167	14.7	42.5	330
4-Nitroaniline	742.5	913.0	757.0	775.8	910.4	828.1	815.8	834.3	805.9	820.3	333	60.5	175	660
4,6-Dinitro-2-methylphenol	766.1	847.6	795.6	735.8	828.1	755.0	786.3	772.6	782.4	785.5	333	34.9	101	660
n-Nitrosodiphenylamine	368.9	399.2	374.2	359.5	389.2	367.9	354.9	352.5	362.7	369.9	167	15.6	45.1	330
1,2-Diphenylhydrazine	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	167	TBD	TBD	330
4-Bromophenyl phenylether	430.9	426.5	401.8	430.8	410.8	412.2	391.6	430.1	412.4	416.3	167	14.1	40.9	330
Hexachlorobenzene	454.2	481.1	445.8	442.8	453.9	477.2	470.7	464.8	433.4	458.2	167	16.3	47.2	330
Atrazine	173.1	188.4	171.7	162.6	151.5	171.9	153.6	172.4	177.7	169.2	167	11.6	33.6	330
Pentachlorophenol	397.4	318.8	385.2	394.5	307.1	383.5	331.5	380.5	382.3	364.5	333	35.0	101	660
Phenanthrene	395.0	428.3	401.0	394.8	416.3	377.9	412.5	408.8	394.1	403.2	167	14.9	43.3	330
Anthracene	376.2	409.4	371.9	358.1	381.2	373.7	369.4	365.5	379.7	376.1	167	14.4	41.6	330
Carbazole	427.0	483.3	437.2	446.0	465.6	446.3	447.3	442.3	429.8	447.2	167	17.6	51.0	330
Di-n-butylphthalate	396.8	435.9	387.4	386.7	409.8	388.7	387.7	400.9	383.2	397.5	167	16.7	48.4	330
Fluoranthene	406.8	451.1	409.9	408.3	424.0	415.9	407.5	418.5	415.2	417.5	167	13.9	40.1	330
Benzidine	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	3330	TBD	TBD	660

Reporting Limit = Low Level Standard

CompuChem Method Detection Limit Study

Study Date: February 22, 2001		GCMS Method 3540C/8270C Solid Matrix, TCL and PPL Compounds											
Instrument: 5972HP60													
Compound Name	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	S.Dev.	MDL	Report Limit
	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Pyrene	384.3	420.0	391.6	393.3	410.0	368.5	375.3	394.5	376.0	390.4	167	16.7	48.5	330
Butylbenzylphthalate	391.3	446.3	423.6	410.1	414.6	399.7	405.1	412.0	411.2	412.6	167	15.6	45.2	330
3,3'-Dichlorobenzidine	898.4	1044.8	937.5	919.8	972.7	915.7	853.7	961.7	971.5	941.8	167	54.4	158	330
bis(2-ethylhexyl)phthalate	413.7	641.5	425.8	461.0	463.4	417.4	427.2	422.6	*	459.1	167	76.1	228	330
Benzo(a)anthracene	448.3	475.6	440.6	425.4	481.8	470.1	434.6	447.6	457.6	453.5	167	19.2	55.7	330
Chrysene	388.8	483.7	393.9	427.6	430.8	395.1	420.9	449.5	452.9	427.0	167	31.6	91.6	330
Di-n-octylphthalate	348.5	365.1	354.9	355.8	348.9	352.7	329.1	353.4	346.5	350.5	167	9.7	28.1	330
Benzo(b)fluoranthene	402.9	490.1	391.0	343.9	428.9	450.7	349.4	365.6	413.8	404.0	167	48.2	139	330
Benzo(k)fluoranthene	367.0	385.1	374.4	458.7	393.4	352.3	426.7	470.5	367.8	399.5	167	42.5	123	330
Benzo(a)pyrene	353.9	388.3	341.9	341.3	356.1	340.1	342.2	350.9	347.5	351.4	167	15.1	43.6	330
Indeno(1,2,3-c,d)pyrene	335.3	378.5	328.5	307.7	369.3	325.5	338.5	352.1	335.5	341.2	167	22.1	63.9	330
Dibenzo(a,h)anthracene	390.3	427.2	386.4	378.7	412.0	377.1	394.9	397.3	391.6	395.1	167	15.9	46.0	330
Benzo(g,h,i)perylene	380.1	410.9	364.8	343.1	407.5	367.1	368.3	392.4	386.9	380.1	167	21.8	63.2	330

Reporting Limit = Low Level Standard

CompuChem Method Detection Limit Study

Study Date: February 25, 2002				Solid Digested Mercury 245.5/7471A								
Instrument: Leeman -V2												
Parameter	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Mean	Amt.	S.Dev.	MDL	Report Limit
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Mercury	0.0200	0.0223	0.0231	0.0234	0.0221	0.0235	0.0246	0.0222	0.0226	0.02	0.00138	0.0044	0.2

Reporting Limit = Low Level Standard

CompuChem Method Detection Limit Study

Study Date: February 6, 2002		Aqueous Digested Mercury Method ILM04.1, ILM05.2, 245.1, 7470A											
Instrument: Leeman -V2													
Parameter	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Mean	Amt.	S.Dev.	MDL	Report Limit
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Mercury	0.173	0.149	0.155	0.150	0.156	0.151	0.153	0.155	0.153	0.20	0.0025	0.0076	0.2

Reporting Limit = Contract-Required Detection Limit (CRDL) for ILM04.1 or
Contract-Required Quantitation Limit (CRQL) for ILM05.2

Amt. = Spike Amount

CompuChem Method Detection Limit Study

				SW846 Aqueous Digested Metals Method 3010A/6010B									
Study Date: February 12, 2002 & March 1, 2002													
Instrument: P4 (Trace)													
Parameter	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	S.Dev.	MDL	Report Limit
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	11.89	14.21	3.89	14.21	7.87	15.75	5.87	15.91	NA	11.20	50.0	4.697	14.1	100
Antimony	7.01	7.68	9.11	8.68	6.98	7.49	8.24	7.77	NA	7.87	6.5	0.761	2.3	10
Arsenic	9.47	10.4	9.23	10.5	11.2	10.3	9.35	8.98	NA	9.92	10.0	0.774	2.3	10
Barium	1.69	1.72	1.74	1.83	1.70	1.90	1.74	1.69	NA	1.75	1.3	0.0758	0.23	10
Beryllium	0.213	0.277	0.313	0.297	0.233	0.284	0.229	0.256	NA	0.263	0.25	0.0357	0.11	5.0
Bismuth	6.60	7.39	8.02	9.01	7.54	7.95	7.46	6.49	NA	7.56	7.0	0.808	2.4	50
Cadmium	0.771	0.657	0.808	0.661	0.868	0.794	0.602	0.816	NA	0.747	1.0	0.0944	0.28	5.0
Calcium	39.55	41.90	45.23	45.71	42.01	49.08	37.98	36.33	NA	42.22	70.0	4.280	12.8	1000
Chromium	2.12	2.14	2.54	2.22	2.26	2.19	2.27	2.31	NA	2.26	2.0	0.132	0.39	5.0
Cobalt	1.17	1.13	1.13	1.17	1.11	1.21	1.09	0.73	NA	1.09	1.3	0.150	0.45	5.0
Copper	3.26	4.30	3.57	4.00	3.74	3.50	3.53	3.49	NA	3.67	1.3	0.331	1.0	5.0
Iron	28.52	29.84	44.69	34.52	38.80	38.83	36.30	21.62	NA	34.14	37.5	7.237	21.7	100
Lead	4.25	4.57	5.37	4.09	4.09	3.89	3.91	4.84	NA	4.38	4.0	0.517	1.6	3.0
Magnesium	45.74	45.12	72.21	72.83	90.51	47.04	65.11	50.45	NA	61.13	12.5	16.67	50.0	1000
Manganese	2.30	1.53	1.87	1.61	1.57	1.55	1.46	1.32	NA	1.65	1.3	0.303	0.91	10
Molybdenum	2.42	1.99	2.45	2.25	2.27	2.29	2.28	2.50	NA	2.31	2.5	0.159	0.48	5.0
Nickel	1.87	2.41	2.27	3.14	2.94	2.42	2.08	2.17	NA	2.41	2.5	0.430	1.3	5.0
Potassium	91.29	124.7	145.7	117.9	152.2	98.77	137.9	66.01	NA	116.81	75.0	29.65	88.9	1000
Selenium	9.87	11.0	11.6	11.8	9.78	11.6	11.7	11.1	NA	11.1	10.0	0.820	2.5	5.0
Silver	2.03	1.80	1.81	1.95	1.97	2.00	2.11	1.91	NA	1.95	2.0	0.106	0.32	5.0
Sodium	392.0	498.9	524.0	503.0	499.0	481.0	541.0	368.0	NA	475.9	500	62.17	186	2000
Thallium	3.20	3.82	1.58	0.707	2.81	2.63	2.96	3.91	NA	2.70	7.5	1.09	3.3	10
Tin	12.09	13.02	12.66	14.11	13.57	13.40	13.39	13.63	NA	13.23	12.5	0.629	1.9	20
Titanium	51.17	50.27	50.72	54.06	54.68	53.20	48.56	50.42	49.54	51.40	50.0	2.10	6.1	40
Vanadium	1.25	1.31	1.26	1.41	1.46	1.36	1.02	1.18	NA	1.28	1.3	0.139	0.42	20
Zinc	15.3	16.5	15.4	17.0	16.2	16.2	14.9	15.5	NA	15.9	13	0.728	2.2	20

Reporting Limit = Practical Quantitation Limit (PQL)

Amt. = Spike Amount

CompuChem Method Detection Limit Study

Study Date: March 1, 2002				SW846 Solid Digested Metals Method 3050B/6010B							
Instrument: P4 (Trace)											
Parameter	Rep#1 mg/Kg	Rep#2 mg/Kg	Rep#3 mg/Kg	Rep#4 mg/Kg	Rep#5 mg/Kg	Rep#6 mg/Kg	Rep#7 mg/Kg	Mean mg/Kg	Amt. mg/Kg	S.Dev. mg/Kg	MDL mg/Kg
Aluminum	1.03	1.30	1.24	1.16	3.49	0.87	0.556	1.38	4.00	0.966	3.0
Antimony	0.887	0.881	0.871	0.865	0.792	0.788	0.648	0.819	0.45	0.0858	0.27
Arsenic	0.759	0.849	0.834	0.891	0.792	0.855	0.800	0.826	1.00	0.0447	0.14
Barium	0.164	0.172	0.172	0.195	0.167	0.165	0.167	0.172	0.10	0.0107	0.034
Beryllium	0.209	0.208	0.211	0.212	0.212	0.214	0.204	0.210	0.20	0.00333	0.010
Bismuth	1.25	1.15	1.21	1.12	1.42	1.20	1.28	1.23	1.00	0.100	0.31
Cadmium	0.0446	0.0482	0.0504	0.0354	0.0402	0.0462	0.0280	0.0419	0.08	0.00792	0.025
Calcium	8.34	8.38	8.47	8.78	10.9	8.66	13.5	9.58	1.00	1.95	6.1
Chromium	0.180	0.186	0.228	0.246	0.217	0.202	0.209	0.210	0.13	0.0230	0.072
Cobalt	0.116	0.103	0.152	0.113	0.134	0.107	0.130	0.122	0.13	0.0173	0.055
Copper	0.110	0.287	0.143	0.188	0.188	0.208	0.213	0.191	0.13	0.0560	0.18
Iron	9.66	11.7	11.5	11.1	11.4	13.5	11.2	11.4	10.0	1.14	3.6
Lead	0.486	0.466	0.392	0.527	0.371	0.483	0.444	0.453	0.30	0.0550	0.17
Magnesium	4.93	4.42	4.87	4.79	4.92	4.54	4.63	4.73	2.00	0.202	0.64
Manganese	0.301	0.251	0.283	0.259	0.260	0.246	0.249	0.264	0.20	0.0204	0.064
Molybdenum	0.209	0.278	0.242	0.263	0.240	0.229	0.231	0.242	0.25	0.0229	0.072
Nickel	0.211	0.149	0.166	0.198	0.162	0.161	0.226	0.182	0.25	0.0295	0.093
Potassium	23.8	27.9	27.6	31.2	28.3	30.4	24.3	27.6	15.0	2.78	8.7
Selenium	0.870	0.854	0.849	0.991	1.01	0.958	0.803	0.905	0.75	0.0805	0.25
Silver	0.290	0.252	0.281	0.306	0.327	0.255	0.315	0.289	0.25	0.0289	0.091
Sodium	71.78	72.70	71.90	75.20	77.80	63.30	76.60	72.75	50.00	4.784	15.0
Thallium	0.865	0.662	0.563	0.859	0.755	0.503	0.666	0.696	1.50	0.139	0.44
Tin	1.78	1.90	1.88	1.88	1.74	1.90	1.86	1.85	1.00	0.0629	0.20
Titanium	0.313	0.329	0.324	0.33	0.323	0.323	0.318	0.323	0.30	0.00598	0.019
Vanadium	0.115	0.167	0.132	0.181	0.165	0.123	0.156	0.148	0.125	0.0251	0.079
Zinc	1.56	1.70	1.70	1.65	1.67	1.68	1.65	1.66	1.25	0.0487	0.15

Reporting Limit = Practical Quantitation Limit (PQL)

Amt. = Spike Amount

CompuChem Method Detection Limit Study

Report Limit
mg/Kg
10.00
1.00
1.00
1.00
0.50
5.00
0.50
100.00
0.50
0.50
0.50
10.00
0.30
100.00
1.00
0.50
0.50
100.00
0.50
0.50
200.00
1.00
2.00
4.00
2.00
2.00

Reporting Limit = Practical Quantitation Limit (PQL)

Amt. = Spike Amount

CompuChem Method Detection Limit Study

Study Date: January 30, 2002 and April 22, 2002					SW846 Solid Digested Metals Method 3050B/6010B								
Instrument: P3 (Trace)													
Parameter	Rep#1 mg/Kg	Rep#2 mg/Kg	Rep#3 mg/Kg	Rep#4 mg/Kg	Rep#5 mg/Kg	Rep#6 mg/Kg	Rep#7 mg/Kg	Rep#8 mg/Kg	Rep#9 mg/Kg	Mean mg/Kg	Amt. mg/Kg	S.Dev. mg/Kg	MDL mg/Kg	Report Limit mg/Kg
Aluminum	9.75	8.84	*	8.54	9.06	9.20	9.22	9.81	8.98	9.17	8.0	0.430	1.3	10.0
Antimony	0.522	0.600	0.605	0.550	0.586	0.533	0.493	0.529	0.436	0.539	0.45	0.0544	0.16	1.0
Arsenic	0.785	0.857	0.834	0.790	0.842	0.957	0.767	0.827	0.819	0.831	1.0	0.0557	0.16	1.0
Barium	0.121	0.122	0.126	0.147	0.117	0.123	0.119	0.131	0.122	0.125	0.10	0.00898	0.026	1.0
Beryllium	0.229	0.239	0.233	0.231	0.233	0.225	0.234	0.220	0.230	0.230	0.20	0.00554	0.016	0.50
Bismuth	0.759	0.707	0.858	0.844	0.896	0.821	0.751	0.792	0.796	0.803	1.0	0.0589	0.17	5.0
Cadmium	0.0334	0.0119	0.0425	0.0302	0.0291	0.0252	0.0342	0.0331	0.0294	0.0299	0.075	0.00828	0.024	0.50
Calcium	5.80	5.50	5.04	5.37	5.35	4.87	4.43	5.13	5.12	5.18	10.0	0.394	1.1	100
Chromium	0.0101	0.0020	0.0787	0.0661	0.0537	0.0457	0.0497	0.0412	0.0326	0.0422	0.13	0.0246	0.071	0.50
Cobalt	0.118	0.134	0.146	0.112	0.148	0.137	0.133	0.126	0.116	0.130	0.13	0.0130	0.038	0.50
Copper	0.0376	0.00463	0.0617	0.0507	0.0143	0.0389	*	0.196	*	0.0576	0.13	0.0640	0.20	0.50
Iron	12.2	12.4	13.5	12.1	12.3	14.1	12.1	13.1	11.6	12.6	10.0	0.809	2.3	10.0
Lead	0.513	0.468	0.441	0.423	0.465	0.446	0.452	0.476	0.419	0.456	0.30	0.0289	0.084	0.30
Magnesium	3.03	3.04	3.08	2.88	2.92	2.86	2.77	2.87	2.68	2.90	2.0	0.130	0.38	100
Manganese	0.210	0.160	0.187	0.184	0.192	0.148	0.165	0.232	0.168	0.183	0.20	0.0265	0.077	1.0
Molybdenum	0.213	0.213	0.222	0.165	0.168	0.229	0.178	0.185	0.211	0.198	0.25	0.0242	0.070	0.50
Nickel	0.173	0.130	0.177	*	0.175	0.147	0.155	0.168	0.154	0.160	0.25	0.0164	0.049	0.50
Potassium	10.5	8.7	11.5	11.4	10.4	11.4	10.3	10.8	11.1	10.7	15.0	0.857	2.5	100
Selenium	0.729	0.655	0.680	0.649	0.705	0.671	0.665	0.626	0.601	0.665	0.75	0.0385	0.11	0.50
Silver	0.240	0.278	0.244	0.253	0.250	0.261	0.252	0.258	0.237	0.253	0.25	0.0124	0.036	0.50
Sodium	115.6	106.9	126.7	111.7	119.7	123.2	114.7	116.3	108.0	115.8	50.0	6.592	19.1	200
Thallium	0.810	0.795	0.943	0.965	0.787	0.814	0.889	0.808	0.985	0.866	1.5	0.0796	0.23	1.0
Tin	0.455	0.437	0.668	0.548	0.578	0.510	0.410	0.596	0.270	0.497	1.0	0.119	0.34	2.0
Titanium	0.99	1.01	0.85	1.00	1.11	1.03	0.94	1.58	1.14	1.07	0.60	0.210	0.61	4.0
Vanadium	0.180	0.144	0.175	0.154	0.178	0.188	0.157	0.170	0.152	0.166	0.13	0.0151	0.044	2.0
Zinc	1.00	0.971	1.02	1.12	0.977	0.872	1.02	1.02	0.936	0.992	1.3	0.0674	0.20	2.0

*Data point not utilized based upon Dixon Outlier Test

Reporting Limit = Practical Quantitation Limit (PQL)

CompuChem Method Detection Limit Study

Study Date: April 22 & 26, 2002			SW846 Aqueous Digested Metals Method 3010A/6010B											
Instrument: P3 (Trace)														
Parameter	Rep#1	Rep#2	Rep#3	Rep#4	Rep#5	Rep#6	Rep#7	Rep#8	Rep#9	Mean	Amt.	S.Dev.	MDL	Report Limit
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	150.7	119.6	118.6	124.7	117.4	123.5	126.4	168.1	118.0	129.7	100	17.70	51.2	100
Antimony	11.9	13.2	12.1	12.6	12.2	12.0	11.5	12.5	12.9	12.3	13.0	0.532	1.5	10.0
Arsenic	22.3	20.8	20.7	23.7	21.5	21.7	20.7	20.5	21.5	21.5	20.0	1.04	3.0	10.0
Barium	0.535	0.428	0.448	0.470	0.419	0.428	0.417	0.414	0.531	0.455	0.63	0.0479	0.14	10.0
Beryllium	0.885	0.854	0.882	0.883	0.859	0.909	0.844	0.921	0.848	0.876	0.50	0.0271	0.079	5.0
Bismuth	12.7	13.7	13.0	12.8	11.0	13.4	12.5	12.4	12.7	12.7	14.0	0.764	2.2	50.0
Cadmium	0.170	0.101	0.0435	0.116	0.0731	0.162	0.0900	0.0752	0.240	0.119	0.50	0.0612	0.18	5.0
Calcium	70.1	65.2	64.8	61.9	62.6	62.1	63.0	59.2	66.8	64.0	140	3.17	9.2	1000
Chromium	2.55	2.44	2.78	2.69	2.51	2.69	2.27	2.30	2.70	2.55	4.0	0.185	0.53	5.0
Cobalt	2.59	2.32	2.78	2.65	2.70	2.27	2.65	2.48	2.74	2.58	2.5	0.181	0.52	5.0
Copper	1.02	1.06	1.09	1.07	1.23	0.92	1.42	0.92	1.34	1.12	2.5	0.176	0.51	5.0
Iron	79.59	68.78	75.51	78.82	76.26	71.16	76.22	71.95	73.72	74.67	75.0	3.579	10.4	100
Lead	7.41	6.90	8.05	7.01	8.31	7.74	7.85	7.43	7.55	7.58	8.0	0.459	1.3	3.0
Magnesium	30.1	27.2	26.3	26.1	27.9	23.2	26.3	24.0	26.5	26.4	25.0	2.02	5.9	1000
Manganese	0.638	0.667	0.629	0.622	0.567	0.608	0.616	0.585	0.587	0.613	0.63	0.0307	0.089	10.0
Molybdenum	4.06	4.24	4.07	4.04	4.22	4.45	4.14	3.91	4.04	4.13	5.0	0.155	0.45	5.0
Nickel	3.99	4.11	4.16	4.15	4.15	4.03	3.84	4.11	4.60	4.13	5.0	0.203	0.59	5.0
Potassium	104.1	93.58	103.8	93.09	100.2	94.72	101.4	100.0	104.9	99.54	150	4.641	13.4	1000
Selenium	7.99	6.10	7.92	5.72	5.73	5.65	6.78	7.40	6.16	6.61	5.0	0.951	2.8	5.0
Silver	4.14	3.62	3.84	3.84	3.82	4.01	3.96	3.75	4.03	3.89	4.0	0.159	0.46	5.0
Sodium	1192	1114	1230	1159	1153	1087	1137	1153	1186	1157	1000	42.67	124	2000
Thallium	15.1	16.0	14.4	15.5	15.4	16.2	14.5	16.0	14.6	15.3	15.0	0.697	2.0	10.0
Tin	13.7	12.3	11.5	12.6	12.3	11.7	13.1	11.5	12.7	12.4	25.0	0.746	2.2	20.0
Titanium	44.2	41.1	43.9	39.9	42.7	42.9	42.1	42.6	44.6	42.7	50.0	1.49	4.3	40.0
Vanadium	2.725	2.682	2.700	3.027	2.832	2.411	2.777	2.671	2.819	2.738	2.5	0.1646	0.477	20.0
Zinc	17.8	18.0	17.5	17.4	17.7	18.8	17.4	18.0	17.7	17.8	25.0	0.424	1.2	20.0

Reporting Limit = Practical Quantitation Limit (PQL)

Amt. = Spike Amount

CompuChem Method Detection Limit Study

Study Date: January 30, 2002 and April 22, 2002					SW846 Solid Digested Metals Method 3050B/6010B								
Instrument: P3 (Trace)													
Parameter	Rep#1 mg/Kg	Rep#2 mg/Kg	Rep#3 mg/Kg	Rep#4 mg/Kg	Rep#5 mg/Kg	Rep#6 mg/Kg	Rep#7 mg/Kg	Rep#8 mg/Kg	Rep#9 mg/Kg	Mean mg/Kg	Amt. mg/Kg	S.Dev. mg/Kg	MDL mg/Kg	Report Limit mg/Kg
Aluminum	9.75	8.84	*	8.54	9.06	9.20	9.22	9.81	8.98	9.17	8.0	0.430	1.3	10.0
Antimony	0.522	0.600	0.605	0.550	0.586	0.533	0.493	0.529	0.436	0.539	0.45	0.0544	0.16	1.0
Arsenic	0.785	0.857	0.834	0.790	0.842	0.957	0.767	0.827	0.819	0.831	1.0	0.0557	0.16	1.0
Barium	0.121	0.122	0.126	0.147	0.117	0.123	0.119	0.131	0.122	0.125	0.10	0.00898	0.026	1.0
Beryllium	0.229	0.239	0.233	0.231	0.233	0.225	0.234	0.220	0.230	0.230	0.20	0.00554	0.016	0.50
Bismuth	0.759	0.707	0.858	0.844	0.896	0.821	0.751	0.792	0.796	0.803	1.0	0.0589	0.17	5.0
Cadmium	0.0334	0.0119	0.0425	0.0302	0.0291	0.0252	0.0342	0.0331	0.0294	0.0299	0.075	0.00828	0.024	0.50
Calcium	5.80	5.50	5.04	5.37	5.35	4.87	4.43	5.13	5.12	5.18	10.0	0.394	1.1	100
Chromium	0.0101	0.0020	0.0787	0.0661	0.0537	0.0457	0.0497	0.0412	0.0326	0.0422	0.13	0.0246	0.071	0.50
Cobalt	0.118	0.134	0.146	0.112	0.148	0.137	0.133	0.126	0.116	0.130	0.13	0.0130	0.038	0.50
Copper	0.0376	0.00463	0.0617	0.0507	0.0143	0.0389	*	0.196	*	0.0576	0.13	0.0640	0.20	0.50
Iron	12.2	12.4	13.5	12.1	12.3	14.1	12.1	13.1	11.6	12.6	10.0	0.809	2.3	10.0
Lead	0.513	0.468	0.441	0.423	0.465	0.446	0.452	0.476	0.419	0.456	0.30	0.0289	0.084	0.30
Magnesium	3.03	3.04	3.08	2.88	2.92	2.86	2.77	2.87	2.68	2.90	2.0	0.130	0.38	100
Manganese	0.210	0.160	0.187	0.184	0.192	0.148	0.165	0.232	0.168	0.183	0.20	0.0265	0.077	1.0
Molybdenum	0.213	0.213	0.222	0.165	0.168	0.229	0.178	0.185	0.211	0.198	0.25	0.0242	0.070	0.50
Nickel	0.173	0.130	0.177	*	0.175	0.147	0.155	0.168	0.154	0.160	0.25	0.0164	0.049	0.50
Potassium	10.5	8.7	11.5	11.4	10.4	11.4	10.3	10.8	11.1	10.7	15.0	0.857	2.5	100
Selenium	0.729	0.655	0.680	0.649	0.705	0.671	0.665	0.626	0.601	0.665	0.75	0.0385	0.11	0.50
Silver	0.240	0.278	0.244	0.253	0.250	0.261	0.252	0.258	0.237	0.253	0.25	0.0124	0.036	0.50
Sodium	115.6	106.9	126.7	111.7	119.7	123.2	114.7	116.3	108.0	115.8	50.0	6.592	19.1	200
Thallium	0.810	0.795	0.943	0.965	0.787	0.814	0.889	0.808	0.985	0.866	1.5	0.0796	0.23	1.0
Tin	0.455	0.437	0.668	0.548	0.578	0.510	0.410	0.596	0.270	0.497	1.0	0.119	0.34	2.0
Titanium	0.99	1.01	0.85	1.00	1.11	1.03	0.94	1.58	1.14	1.07	0.60	0.210	0.61	4.0
Vanadium	0.180	0.144	0.175	0.154	0.178	0.188	0.157	0.170	0.152	0.166	0.13	0.0151	0.044	2.0
Zinc	1.00	0.971	1.02	1.12	0.977	0.872	1.02	1.02	0.936	0.992	1.3	0.0674	0.20	2.0
*Data point not utilized based upon Dixon Outlier Test														

Reporting Limit = Practical Quantitation Limit (PQL)

Attachment 7

Applicable Material Safety Data Sheets

Appendix C
Construction Quality Control Plan

QUALITY CONTROL PLAN
FOR
RAC Action
St. Julien's Creek Annex
IRA at Sites 3, 6, and 7
Chesapeake, Virginia

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Atlantic Division
Naval Facilities Engineering Command
6500 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, Virginia 23508

Prepared by:
Shaw Environmental & Infrastructure, Inc.
(formerly OHM Remediation Services Corp.)
LANTDIV Program Management Office
5700 Thurston Avenue, Suite 116
Virginia Beach, Virginia 23455-3302

____
P. Taylor Sword, C.P.G
Sr. Project Manager

____
Charles W. Hunter
Program QC Manager

____
Roland Moreau, P.E.
Program Manager

July 29, 2002
Task Order 0085
Shaw/OHM Project 838067

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Statement of QC Program

Shaw Environmental & Infrastructure, Inc. (formerly OHM Remediation Services Corp., Inc.), (Shaw/OHM), will provide and maintain an effective Quality Control (QC) Program. This program will be performed in accordance with the approved Program Quality Control Plan (PQCP) developed specifically to be responsive to the contract specification, Contract No. N62470-97-D-5000, Atlantic Division, Naval Facilities Engineering Command and to the Task Order (TO) specification(s) made applicable to each project, task or work activity. IT/OHM will perform the inspections and tests required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements.

Note to Employees

Quality Control should not be considered a person or an organization of personnel, but a concept to perform in such a manner that the end product of our efforts meet established criterion, the customer's needs. The Quality Control individual or group cannot inspect quality into the final product, but only inspect and document the results of our efforts. The only person that can build quality into the product are the individuals performing the task of producing the end product.

It should be noted by all employees that the documentation requirements of Shaw/OHM procedures, plans, and the task order specifications are considered equally as important as the end product itself. When it is stated that the documentation will be approved prior to the start of work, this is exactly what is intended. To eliminate problems in this area requires careful planning and execution by everyone.

We would do well to remember that our livelihood depends on how well we satisfy our customer. To accomplish this requires teamwork and attention to detail by all employees and contractors.

I. QUALITY CONTROL ORGANIZATION

The QC organization is depicted in the Organizational Chart, Figure I-l.

II. IDENTIFICATION OF PERSONNEL ASSIGNED TO THE QC ORGANIZATION

Figure II-I provides the resume of the Site QC Manager / Representative. The resumes of any additional QC staff members will be submitted to the CO for approval prior to assignment. This action will be performed in accordance with the contract specification Section C, Part 6.5.

III. APPOINTMENT LETTERS

The Site QC Manager / Representative appointment letter is provided as Figure III-1. Similar letters will be provided when necessary to describe the duties and authorities of personnel assigned to the position of Altemate or Assistant QC Manager.

IV. OUTSIDE ORGANIZATIONS

A list for identifying outside organizations such as architectural and consulting engineering firms, and subcontractors employed by Shaw/OHM for work under this task order is provided in Exhibit IV-1. This list will provide each firm's name and address and a description of the services each firm. This list will be completed, maintained current and will be available for review.

V. INITIAL SUBMITTAL REGISTER & REVIEWER

V.1 Submittal Register

A sample Submittal Register is provided as Exhibit V-1. Submittal Registers will be prepared as necessary based on project size and complexity, or as required by individual TO.

V.2 Personnel Authorized to Review and Certify Submittals

Personnel authorized to review and certify submittals other than the Site QC Manager / Representative are identified on Exhibit V-2. Any additional personnel assigned to perform submittal review and certification must be approved by the CO, prior to performance.

VI. TESTING LABORATORY ACCREDITATION

Testing laboratory accreditation requirements are addressed in the contract specification Section C Part 6.12.

VII. TESTING PLAN & LOG PREPARATION

A Testing Plan and Log, Exhibit VI-1, will be prepared for this TO and shall be maintained current.

VIII. QUALITY CONTROL INSPECTION PLAN

The Quality Control Inspection Plan, Exhibit VII-1, lists each specification section and definable feature of work with provisions for recording the corresponding checklist/report for each phase of the three phase control process. As each control phase is satisfactorily preformed, the Site QC Manager/ Representative will record the corresponding checklist/report number.

Note: A definable feature of work is a task which is separate and district from other tasks and requires separate control procedures.

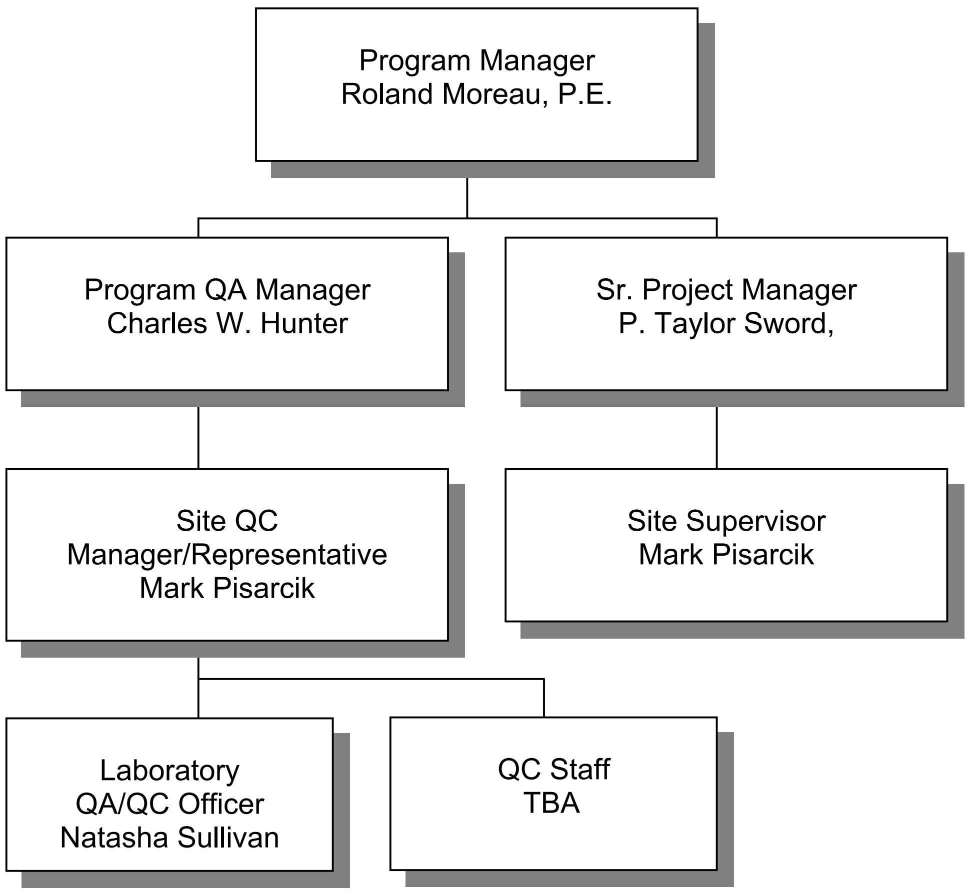
This list has been prepared and maintained in accordance with the contract specification Section C, Part 6.7 and will be agreed upon during the Coordination and Mutual Understanding Meeting. The list will be keyed to the construction schedule. Each preparatory, initial and follow-up phase checklist/report will reflect the construction activity number derived from the construction schedule, and will reference the procedures followed for each control phase.

IX. PERSONNEL MATRIX

The Site QC Manager/Representative will prepare and maintain the personnel matrix, Exhibit VIII- I, showing each section of the TO specification with identification of who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document testing. This matrix should be completed as much as possible prior to and during site mobilization. The matrix will be maintained current by the Site QC Manager / Representative and will be available for review.

Figure I-1

Shaw Environmental & Infrastructure, Inc.
(formerly OHM Remediation Services Corporation)
Task order No. 0085
QC Organizational Chart



Mark Pisarcik

Figure II-1

Professional Qualifications

Mr. Pisarcik joined IT Corp. in 1993 and has extensive experience involving the management/supervision of operation & maintenance activities for groundwater remediation systems. These systems include; air sparge /soil vapor extraction, free phase waste oil recovery, groundwater pump & treat, and total fluids recovery treatment methods. In addition, he also has project supervision experience involving various other types of remedial action projects. Furthermore, he possesses detailed field technical experience with several types of environmental air, liquid, and soil sampling, monitoring, and testing instruments and methods.

Education

B.S., Environmental Science, Slippery Rock University of Pennsylvania, 1992.

Additional Training:
Ensys 8-hour Immunoassay Field Testing Certification
Red Cross First Aid/CPR Training
IT Corp. Confined Space Entry Supervisor Training
OHM 40-hour Environmental Sampling Training
OHM 8-hour Hazardous Waste Operations and Emergency Response Supervisor Training
OSHA 40-hour Hazardous Waste Training, 1993
OSHA 8-hour Hazardous Waste Refresher Training, updated annually
Troxler Nuclear Density Gauge Operation and Radiological Safety Certification
U.S. Army Corps. Of Engineers Quality Construction Management Training

Professional Experience

U.S. Navy LANTDIV RAC III - Currently serving as the Project Superintendent for a remedial action project (TO 060) at the Camp Allen Salvage Yard in Norfolk, VA. This project involves in-situ soil stabilization methods, excavation and disposal of contaminated materials, storm sewer line cleaning/repairs, and site restoration activities. Duties include; supervision of site personnel and subcontractors, coordinating and tracking production activities, client relations, health & safety and QC management, and field technical support (sampling, air monitoring, and excavation competent engineer). **(April '01 to present)**

U.S. Navy LANTDIV RAC I & III – Currently serving as the Operations & Maintenance Manager for several groundwater remediation facilities under TO 025, TO 019, and TO 153 . Responsibilities include: Supervision and training of personnel; health &safety and QC management; performing electrical, mechanical, and process trouble-shooting and repairs; performing routine O&M tasks; procurement, coordination, and oversight of subcontractors for repairs/upgrades; procurement of materials and equipment for upgrades, maintenance, and repairs; client relations; implementation of a data management and record keeping system; monthly reporting; and 24-hour emergency on-call status. **(April '98 to present)**

U.S. Navy LANTDIV RAC I – Served as the on-site civil engineer during the construction of a groundwater air sparge/vapor extraction remediation system at the Building LP-20 site on the Naval Base, Norfolk, VA. Responsibilities included: Procurement of materials and equipment meeting design requirements and contract specifications; production of as-built drawings; oversight of construction activities by means of inspection and testing to ensure construction quality control; and soil sampling, analytical data review and interpretation for the disposal of excavated soils. **(July '97 to March '98)**

U.S. Navy LANTDIV RAC I – Responsible for the operations and maintenance of two free-phase waste oil recovery systems and also served as the QC inspector during the installation of a third similar system at the Navy Piers site on the Naval Base, Norfolk, VA. **(Feb '97 to June '97)**

U.S. Navy LANTDIV RAC I – Served as the sample technician for this petroleum hydrocarbon biological treatment project at Craney Island, VA. Responsibilities included: Soil sampling, Ensys field screening, and fertility testing of the bio-cell soil; technical oversight and confirmation sampling of the contaminated materials excavation; and groundwater monitoring well sampling. **(April '96 to Jan '97)**

USACE – Supervised the operations and maintenance of a wastewater treatment facility at the Fike Chemical Superfund site in Nitro, WV. Duties included implementing the health & safety and QC plans, maintaining a report and record keeping system, collecting and analyzing influent and effluent water samples, and operations & maintenance of the water treatment system. **(April '95 to June '95)**

U.S. Navy LANTDIV RAC I – Served as the sample technician for an excavation and landfill capping project at the Bainbridge Naval Training Center in Port Deposit, MD. Responsibilities included; confirmatory soil sampling and supervision of the contaminated soil excavation, written and photo documentation of site activities, cost tracking of out-of-scope work activities, and nuclear densometer compaction testing of soils. **(Jan.'95 -Mar.'95)**

U.S. EPA Region I ERCS – Served as a sample technician at the Lamont Laboratories project in Londonderry, NH. Duties included sampling and hazardous waste categorizing of approximately 2,000 fire damaged drums. **(Nov.'94 to Dec.'94)**

PA Dept. of Environmental Resources – Served as the sample technician for a lead contaminated materials excavation project in Beaver Falls, PA. Responsibilities included; confirmatory soil sampling and oversight of the excavation activities, high volume and personnel air sampling, and analytical data review and interpretation. **(May '94 to Aug.'94)**

OHM Remediation Services Corp.
A Subsidiary of the IT Group

Figure III-1

May 29, 2002

Mr. Mark Pisarcik
Shaw Environmental & Infrastructure, Inc.
5700 Thurston Avenue, Suite 116B
Virginia Beach, VA 23455-3302

RE: Site QC Manager
Contract N62470-97-D-5000
Task Order 0085

Dear Mark:

This letter will serve as your appointment as the Site Quality Control Manager on the referenced project and will also clarify your duties and authority in this position. In this position, you will be authorized to use available resources to satisfy all applicable requirements of the Program and Task Order Quality Control Plan.

This authorization specifically gives you the authority to direct removal and replacement or correction of nonconforming materials or work and stop work authority when continuation would be unsafe to personnel, harmful to the environment, or result in a significant degradation of quality.

You will be expected to work closely with the Project Manager and other project personnel, but you will not be directly responsible to anyone but myself for resolution of quality issues when working in the capacity of Quality Control Manager.

If you have any question in this matter, please call me at (609) 584-6840.

Sincerely,

Charles W. Hunter
Program QC Manager
LANTDIV RAC Program

EXHIBIT IV-1

APPROVED CONSULTANT & SUBCONTRACTOR LIST

COMPANY NAME & ADDRESS:	DESCRIPTION OF SERVICES PROVIDED:
TBD	TBD

EXHIBIT V-2

LIST OF PERSONNEL AUTHORIZED TO REVIEW & CERTIFY SUBMITTALS

SPECIFICATION SECTION:	SUBMITTAL TYPE:	AUTHORIZED PERONNEL:
N/A	All	Taylor Sword

EXHIBIT VI-1

TESTING PLAN AND LOG

CONTRACT NUMBER	PROJECT TITLE & LOCATION	CONTRACTOR
N62470-97-D-5000, Task Order 0085	IRA Sites 3, 6 & 7 St. Julien's Creek Annex, Chesapeake, Virginia	OHM REMEDIATION SERVICES CORP.

SPECIFICATION SECTION AND PARAGRAPH NUMBER	ITEM OF WORK	TEST REQUIRED	ACCREDITED/ APPROVED LAB		SAMPLED BY	TESTED BY	LOCATION OF TEST		FREQUENCY	DATE COMPLETE	DATE FORWARDED TO CONTR. OFF	REMARKS
			YES	NO			ON SITE	OFF SITE				
No specification (See plans)	001	Pre-Mobilization Sampling & Analysis Sites 3, 6 & 7	X						Per FSAP			
	002	Sites 3, 6 & 7 Confirmatory Sampling & Analysis	X						Per FSAP			
	003	Sites 3, 6 & 7 Off-Site Fill Materials	X					X	Per Contract Specification			Physicals and Chemicals

CONTRACT NUMBER	PROJECT TITLE & LOCATION	CONTRACTOR
N62470-97-D-5000, Task Order 0085	IRA Sites 3, 6 & 7 St. Julien's Creek Annex, Chesapeake, Virginia	OHM REMEDIATION SERVICES CORP.

	004	Top Soil	X									VESCH 3.30 Appendix B
	005	Seed & Mulch	X									VESCH 3.32 Appendix B

EXHIBIT VII-1
QUALITY CONTROL INSPECTION PLAN
IRA Sites 3, 6 & 7
St. Julien's Creek Annex, Chesapeake, Virginia
Delivery Order No. 0085, Yorktown, Virginia

Specification Section	Definable Feature of Work	Activity Number*	Control Check Verification		
			Preparatory Phase Checklist/Report No.	Initial Phase Checklist/Report No.	Follow-up Phase Checklist/Report No.
No Specification	<u>Pre-mobilization</u> ▪ Waste Characterization Sampling & Analysis ▪ Utility Markout & Line Termination ▪ Permits <u>Mobilization & Site Preparation</u> ▪ Establish Work & Support Areas ▪ Exclusion & Contamination Reduction Zones ▪ Decontamination Pad ▪ Stockpile Area ▪ Erosion & Sediment Controls <u>IRA Sites 3, 6 & 7</u> ▪ Clearing & Grubbing ▪ Excavation ▪ Confirmatory Sampling ▪ Site Restoration <u>Borrow Area Operations</u> ▪ Clearing & Grubbing ▪ Topsoil Stripping ▪ Fill Excavation ▪ Borrow Area Restoration <u>Decontamination</u> <u>Waste Handling</u> <u>Seeding & Mulching</u>				

Specification Section	Definable Feature of Work	Activity Number*	Control Check Verification		
			Preparatory Phase Checklist/Report No.	Initial Phase Checklist/Report No.	Follow-up Phase Checklist/Report No.

* Include schedule date if a CPM network is invoked.

EXHIBIT VIII-1

PERSONNEL MATRIX

SPECIFICATION SECTION:	SUBMITTAL REVIEWED BY:	THREE PHASE PERFORMED BY:	TESTING PERFORMING BY:
N/A	Site QC Manager	Site QC Manager	TBD

Appendix D
Erosion and Sedimentation Control Plan

EROSION AND SEDIMENTATION CONTROL PLAN
FOR
EXCAVATION OF SOIL AND DEBRIS REMOVAL
AT SITES 3, 6 AND 7
ST. JULIEN'S CREEK ANNEX
CHESAPEAKE, VIRGINIA

Prepared for:

DEPARTMENT OF THE NAVY
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2644
Contract No. N62470-97-D-5000

Prepared by:

OHM Remediation Services Corp.
5700 Thurston Avenue, Suite 116
Virginia Beach, VA 23455

Taylor Sword, C.P.G.
Senior Project Manager

Roland Moreau, P.E
Program Manager

August 7, 2002
IT/OHM Project 838067

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1.0 EROSION AND SEDIMENTATION CONTROL PLAN PURPOSE

The Erosion and Sediment Control Plan describes the erosion and sediment (E&S) control measures to be implemented during remediation activities at the IR Sites 3, 6 and 7, located in St. Julien's Creek Annex, Chesapeake, Virginia. This plan presents information for the construction of E&S controls as required by the Virginia Department of Environmental Quality (VADEQ) and Bureau of Soil and Water Conservation. This plan also contains the information required in the Virginia Department of Conservation and Recreation document, Virginia Erosion and Sediment Control Handbook (VESCH), 3rd edition (1992).

PROJECT ACTIVITIES

This section contains information about remedial activities that will require erosion and sedimentation control. Descriptions of all remediation activities can be found in the Work Plan.

This Scope of Work includes source removal, disposal, and site restoration of defined areas of contamination at IR Sites 3, 6 and 7. The limits of waste have been determined from previous trenching activities and human health and ecological risks have been identified in the Draft Remedial Investigation Report (December 2001). Preliminary Remedial Goals (PRGs) have been proposed to establish clean up goals. These PRGs will be considered the target clean up goals for the purpose of estimating costs for this removal action scope of work. This removal will be conducted in two phases, due to limited funding. Phase one is the subject of this task order.

The objectives of this removal action are to excavate the northern portion of the limits of waste at Site 3, excavate the former cage and soils at Site 6, and dispose of and/or recycle visible wastes at Site 7. The A/E contractor will conduct final confirmation sampling once the limits of excavation have been reached. The use of a field test kits for initial determination of excavation limits in conjunction with quick turn-a-round analysis has been recommended to determine the limits of excavation where PRGs have been met. There is a potential for unexploded ordnance (UXO) at Sites 3 and 6. UXO screening and/or clearance will be required during excavation activities at these sites. The scope of this project has been subdivided into three major tasks. These tasks include Project Planning, Fieldwork, and Post Construction Submittals.

Work items discussed below represent the extent of activities that will require erosion and sedimentation control measures in implementing the Navy's directed scope of work.

Construction activities that may impact runoff requiring erosion and sedimentation controls include the following:

- Site preparation

- UXO survey
- Impacted soil excavation and screening for UXO removal
- Soil stockpiling and loadout
- Equipment decontamination/demobilization
- Site restoration
- Dust control

1.1 SITE PREPARATION

The first task associated with site preparation is the installation of silt fence and other erosion control measures in areas around the proposed excavation. Erosion control measures include:

- Silt fence barriers
- Hay bales where needed
- Stone construction entrances to reduce tire carry
- Minimizing the extent of open excavation
- Decontamination areas for heavy equipment
- Revegetation
- Protection of stockpiles

The erosion control measures installation plan and details are shown on **Figures 1A, 1B and 2**. The areas to be excavated would be marked on the ground with soil paint, surveyor's stakes or flags, or high visibility construction barrier/fence. Silt fence will also be placed as necessary to accommodate site conditions at the direction of the site supervisor and/or project manager and in accordance with this plan. The silt fence will be maintained throughout the course of the project.

1.2 UXO SURVEY

The areas to be excavated will initially be visually surveyed. As noted above, the proposed extent of excavation will be delineated on the ground with ground paint, surveyors stakes or flags, or high visibility plastic construction fencing. The area will be visually inspected on the surface for evidence of large UXO. More extensive investigation will be performed at the discretion of the onsite UXO technical team. Should large potentially energetic UXO be confirmed at anytime, or materials identified which in the opinion of the onsite UXO technicians requires more extensive analysis, the Navy's EOD UXO team will be contacted to perform assessment and inerting of the UXO as needed. As the excavation proceeds, continuing visual inspection will be implemented.

1.3 IMPACTED SOIL EXCAVATION

Impacted soil will be systematically excavated minimizing to the extent practical the amount of open excavation. As areas are excavated, field analytical methods will be used to screen the

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Plot Date/Time: 08/07/02 10:33am
Plotted by: SMITH_A
Image:
Xref: aerial

OFFICE	DRAWING NUMBER	838067-A4
Pittsburgh, PA		

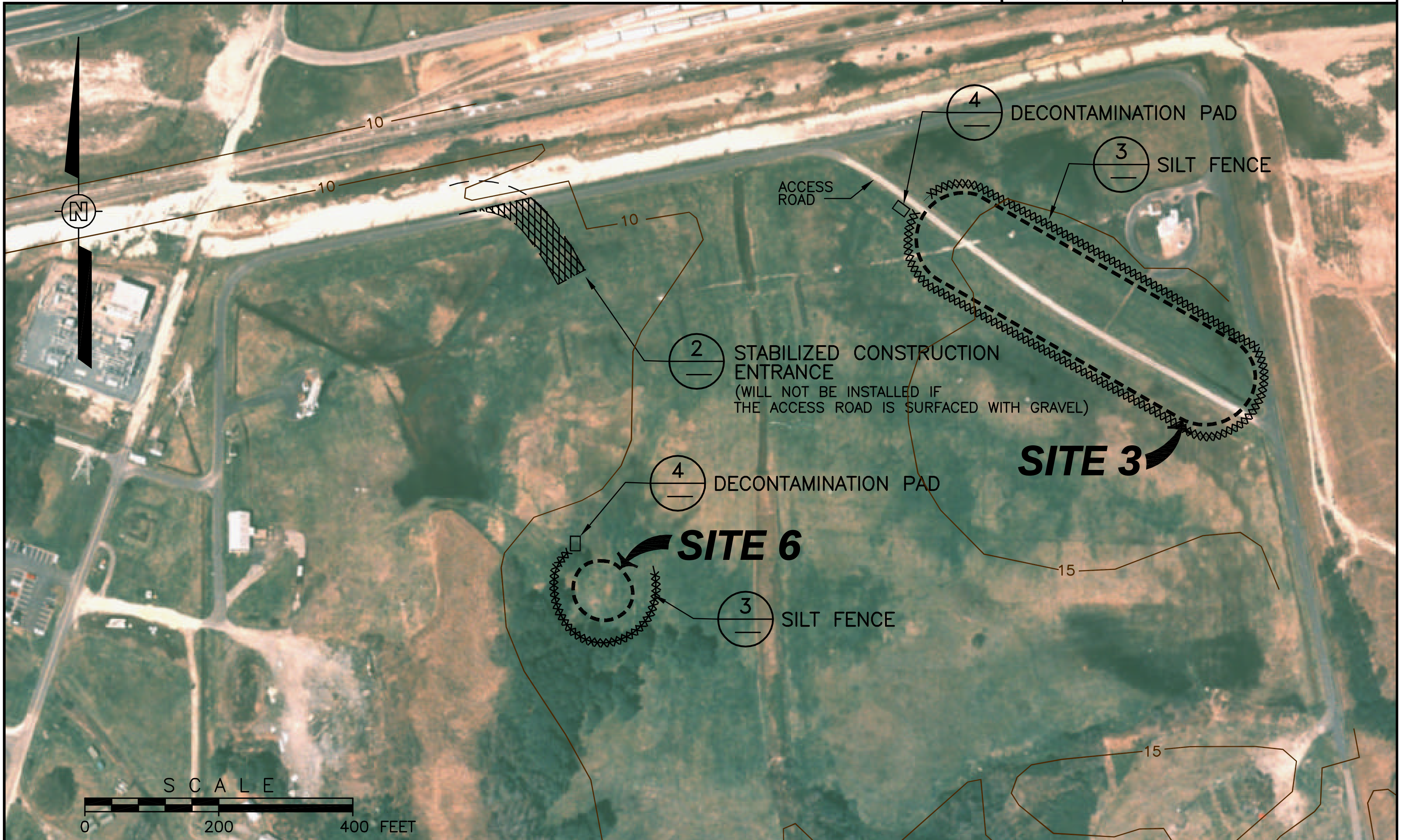

FIGURE 1A

NAVFAC DRAWING NO.
N62470-97-D-5000
CONSTR. CONTRACT NO.
085
DELIVERY ORDER NO.
SCALE: AS SHOWN
SIZE: A

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION
ATLANTIC DIVISION
NORFOLK, VIRGINIA
ST. JULIAN'S CREEK ANNEX
CHESAPEAKE, VIRGINIA

REMEDIAL ACTION
SITES 3 AND 6

EROSION & SEDIMENT CONTROL PLAN – SITES 3 AND SITE 6

OHM Remediation Services Corp.
PROJECT NO. 838067

DESIGNED BY	JS	8/2/02	CHECKED BY	P. Verma	8/6/02
DRAWN BY	LDB	8/2/02	APPROVED BY	J. Sloss	8/6/02

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

REVISIONS

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Plot Date/Time: 08/07/02 10:37am   Image: .
Plotted by: SMITH_A   Xref: aerial

OFFICE	DRAWING NUMBER	838067-A5
Pittsburgh, PA		

NOTE:

SILT FENCE OR STRAW BALES WILL BE INSTALLED DURING TEST PIT EXCAVATION AS NEEDED.

FIGURE 1B

NAVFAC DRAWING NO.

CONSTR. CONTRACT NO. N62470-97-D-5000

DELIVERY ORDER NO. 085

SCALE: AS SHOWN

SIZE: A

DEPARTMENT OF THE NAVY   NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION   ATLANTIC DIVISION   NORFOLK, VIRGINIA
ST. JULIAN'S CREEK ANNEX   CHESAPEAKE, VIRGINIA

REMEDIAL ACTION
SITE 7

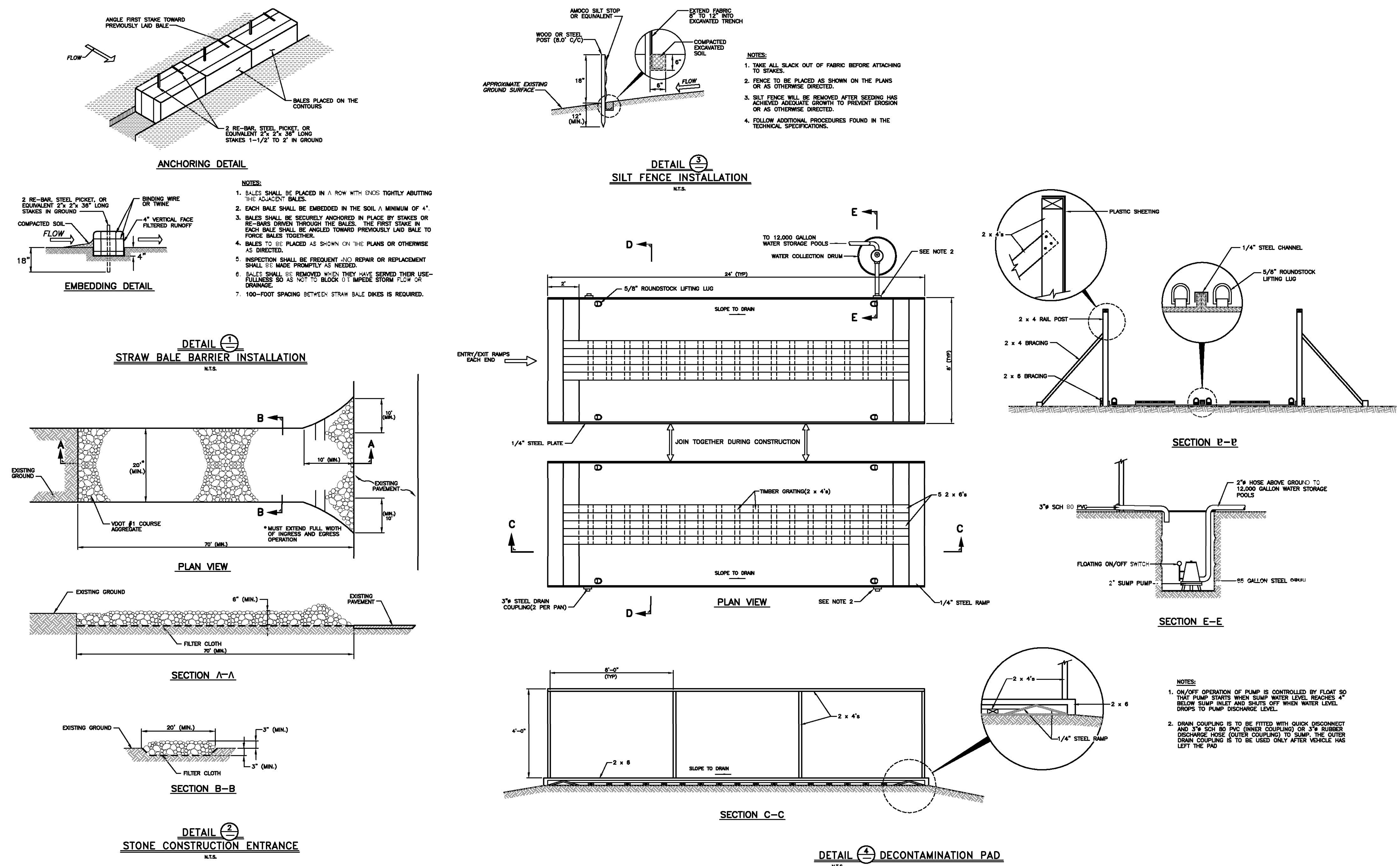
EROSION & SEDIMENT CONTROL PLAN – SITE 7

OHM Remediation Services Corp.
PROJECT NO. 838067

DESIGNED BY	JS	8/2/02	CHECKED BY	P. Verma	8/2/02
DRAWN BY	LDB	8/2/02	APPROVED BY	J. Sloss	8/2/02

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

REVISIONS



NOTES:

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4".
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. BALES TO BE PLACED AS SHOWN ON THE PLANS OR OTHERWISE AS DIRECTED.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULLNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. 100-FOOT SPACING BETWEEN STRAW BALE DIKES IS REQUIRED.

NOTES:

1. TAKE ALL SLACK OUT OF FABRIC BEFORE ATTACHING TO STAKES.
2. FENCE TO BE PLACED AS SHOWN ON THE PLANS OR AS OTHERWISE DIRECTED.
3. SILT FENCE WILL BE REMOVED AFTER SEEDING HAS ACHIEVED ADEQUATE GROWTH TO PREVENT EROSION OR AS OTHERWISE DIRECTED.
4. FOLLOW ADDITIONAL PROCEDURES FOUND IN THE TECHNICAL SPECIFICATIONS.

NOTES:

1. ON/OFF OPERATION OF PUMP IS CONTROLLED BY FLOAT SO THAT PUMP STARTS WHEN SUMP WATER LEVEL REACHES 4" BELOW SUMP INLET AND SHUTS OFF WHEN WATER LEVEL DROPS TO PUMP DISCHARGE LEVEL.
2. DRAIN COUPLING IS TO BE FITTED WITH QUICK DISCONNECT AND 3"φ SCH 80 PVC (INNER COUPLING) OR 3"φ RUBBER DISCHARGE HOSE (OUTER COUPLING) TO SUMP. THE OUTER DRAIN COUPLING IS TO BE USED ONLY AFTER VEHICLE HAS LEFT THE PAD

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Plotted by: SMITH_A
Image: .
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REV	DATE	BY	CHK'D	APPR'VD	DESCRIPTION/ISSUE

REVISIONS

OHM Remediation Services Corp.
PROJECT NO. 838067

DESIGNED BY		CHECKED BY	P. Verma	8/5/02
DRAWN BY	A. Smith 8/5/02	APPROVED BY	J. Sloss	8/5/02

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION — NORFOLK, VIRGINIA
NAVAL STATION ST. JULIAN'S CREEK ANNEX — CHESAPEAKE, VIRGINIA
REMEDIAL ACTION SITES 3, 6, AND 7
EROSION AND SEDIMENT CONTROL DETAILS

SIZE: D
DELIVERY ORDER NO. 085
CONSTR. CONTRACT NO. N62470-93-D-3032
NAVFAC DRAWING NO.

FIGURE 2

soils to gauge remedial progress and the extent excavation will be implemented. Confirmational sampling will also be performed. As certified laboratory analysis is obtained, clean backfill will be placed in the excavation areas and an amended topsoil cover will be placed to revegete the site.

1.4 UXO SCREENING

All excavated soil will be passed through a 1-inch power screen to remove small UXO or spent fragments from the former burning operation. Screened soil will be stockpiled to the minimum extent possible. All spent UXO and recovered fragments or scrap will be turned over to the Navy for recycling or disposal. The screening operation will be set up under the oversight of the trained UXO technical team that will be onsite throughout the entire operation. Lexan™ blast shielding will be constructed around the screening operations to protect the UXO technical team and any nearby equipment operators in the event energetic UXO is encountered and accidentally initiated by the energy of the screen. Should large energetic UXO be encountered, the Navy's ROICC will be alerted and all work in the immediate area will be stopped immediately. The ROICC will then make notification to the Navy's EOD UXO team.

1.5 STOCKPILING AND LOADOUT

Once profile acceptance has been obtained, dry soil will be directly loaded into trucks for offsite disposal. The loading will be done on prepared areas, which will be kept clean. The necessary measures will be implemented to prevent dust, soil tracking by equipment, and runoff/run-on during storm events. Truck loads will be tarped or covered during any over the road transport on public roadways.

1.6 EQUIPMENT DECONTAMINATION/DEMOBILIZATION

Equipment demobilized from the site will be decontaminated prior from the site. Decontamination will consist of moving the equipment to the designated decon area and washing using pressure washer or spray washer to remove all accumulations of sediment or mud. Water from the decontamination operation will be containerized and sent for disposal after profiling. It is expected this water will be not hazardous and disposable through the local or ship yard's wastewater treatment system.

1.7 SITE RESTORATION

Areas where disturbances have occurred will be back-filled with clean fill. The areas will be revegetated with a suitable grass mix. The requirements for revegetation are detailed in Section 2 below. Silt fencing and other erosion and sedimentation control measures will not be removed until competent vegetation has been established that will withstand erosion. Removal of the silt fence will be the final task associated with restoration and construction activities.

1.8 DUST CONTROL

Nuisance dust may occur at the screening station, during excavation activities, or during over the road transport. Water spray will be used at these various locations should visible dust become a problem. The potential for dust will be exacerbated during periods of hot and dry conditions. Depending on the time of construction, the potential for a significant dust problem may be minimal. It will be the responsibility of the Health and Safety Officer to visually inspect operations for excessive dust emissions and implement the necessary measures to mitigate conditions that are excessive

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2.0 MAINTENANCE PROGRAM

This section describes the maintenance programs for the erosion and sedimentation control measures at the site.

2.1 MAINTENANCE OF TEMPORARY CONTROL MEASURES

Maintenance of the erosion and sedimentation controls during the project will be performed by OHM. All controls will be inspected daily, as well as after each storm event, and any breaches will be corrected immediately.

2.2 EROSION AND SEDIMENT CONTROL PLAN

The installation of E&S control measures will allow remediation activities (primarily excavation) to take place while minimizing any threat to the adjacent waterways. The work covered under this task includes installation of silt fence, straw bales, stone construction entrance (SCE), decontamination pad, and seeding and mulching.

The silt fence and straw bales are temporary sediment controls, and will remain in place until permanent erosion control measure (vegetation) is established and approved by Resident Officer in Charge of Construction (ROICC). The major components of E&S control measures are discussed in the following.

2.2.1 Silt Fence / Straw Bale

Silt fence will be installed in accordance with VESCH Standard and Specification 3.05 "Silt Fence." The silt fence will be installed on the down slope side of all excavated or disturbed area at the locations shown in **Figure 1A**, and according to details shown in **Figure 2**.

The ground surface at Site 3 appears to be reasonably flat with less than 2 percent slopes. Prior to excavation or while the excavation is in progress, the silt fence will be installed just beyond the limit of excavation. The site supervisor may limit the silt fence installation to only the downstream side of the excavation. The installation of diversion berms on the upstream side to divert the run on into the excavation is preferable but may not be necessary from the E&S stand point, since the run on can be controlled and confined by the excavation

The VESCH guidelines allow a maximum of 100 ft. of slope length behind (upstream) the silt fence. Therefore, the silt fence layout shown in Figure 1 will remain effective (even after the backfilling is complete), if the crowning of the backfill is assumed to be along the long axis of the excavation area. In the event, the final contours are to deviate from the above criteria, the silt fence are to be installed such that the maximum slope distance behind silt fence is 100 ft.

Site 6 will have the silt fence at the downstream side as shown in the Figure1. No silt fence is contemplated at Site 7, since no intrusive earth activities will be performed.

The silt fence will be inspected weekly, after each rain event, and at least daily during prolonged rainfall. All required repairs will be made immediately. Sediment will be removed and disposed of, if it causes bulging of the geotextile or accumulates to half the height of the silt fence.

In addition to silt fence, straw bale may be used as necessary to collect sediment and prevent it from leaving the construction site and to decrease the velocity of sheet flow. The straw bales will be installed and maintained in accordance with Section 3.04 of the VESCH.

2.2.2 Seeding and Mulching

Seeding and mulching will be performed in accordance VESCH Standard and Specification 3.32 "Permanent Seeding." The seed mix will be as follows.

Table 1
Standard Specifications for Permanent Seeding
Virginia Erosion and Sedimentation Control Handbook

Seed	Application Rate per Acre	Min. % Pure Seed	Min. % Germination and Hard Seed
Kentucky 31 Fescue	128 lbs.	98	90
Red Top Grass	2 lbs.	98	90
Annual Rye*	20 lbs.	98	90

*Nurse crop – September through November 15.

The above seed mix may be revised based on the local availability, with the approval of ROICC.

The fertilizer (10-20-10) will be applied at a rate of 1000 pounds per acre. The lime application will be at a rate of 2 tons of lime per acre.

All permanent seeding will be mulched immediately upon completion of seed application. The straw or hay mulch will be used at a rate of 2 tons per acre, and will be free from weeds and coarse matter. It will be spread with mulch blower or by hand. The anchoring of the mulch will be by Krimpers or by other appropriate methods.

Seeding will be accomplished prior to mulching except where seed is to be applied as part of hydroseeder slurry containing fiber mulch.

The topsoil will be minimum 4-inch thick with a pH range of 6.0 to 7.5. The organic matter content will be 1.5% or higher; and the soluble salts will not exceed 500 ppm. Topsoil will not be placed in muddy (or frozen) condition or when subgrade is excessively wet. The compaction of topsoil will be incidental to placement. The topsoiling will be in accordance with VESCH Standard and Specification 3.30.

2.2.3 Stone Construction Entrance

The stone construction entrance (SCE) will be in accordance with VESCH Standard and Specification 3.02 “Temporary Stone Construction Entrance” and as shown in **Figure 1A and 2**.

Appendix E
UXO Construction Support and Management Plan

UXO CONSTRUCTION SUPPORT PLAN
INTERIM REMEDIAL ACTION
SITES 3, 6 AND 7
ST. JULIEN'S CREEK ANNEX
CHESAPEAKE, VIRGINIA

Prepared for:

DEPARTMENT OF THE NAVY
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
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Contract No. N62470-97-D-5000

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September 12, 2002
OHM Project 838067

TABLE OF CONTENTS

1.0 INTRODUCTION

This Appendix provides UXO support procedures that must be followed during the HTRW remedial action activities at Site 6 and Site 3, St Julien's Creek Annex, Chesapeake. It provides the technical basis for observing, locating, identifying, reporting, UXO while conducting excavation activities that may unearth potential or suspect UXO items.

This Plan incorporates the guidance and requirements of Naval Sea Systems Command Instruction (NAVSEAINST) 8023.11, Naval Sea Systems Command (NAVSEA Ordnance Publication (OP) 5, and U.S. Army Engineering and Support Center, Huntsville (CEHNC) Engineer Pamphlet (EP) 75-1-2. The UXO Support Plan addresses the standard operating procedures to be used by all Shaw Environmental and Infrastructure personnel to minimize the risk from ordnance and explosives (OE). The procedures for conducting the UXO support are detailed in the following sections of this plan.

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2.0 BACKGROUND AND SITE CONDITIONS

A 2001 geophysical survey at Site 6 at the St Julien's Creek Annex revealed evidence of an anomaly which may be the former burn cage which was used for preventing kick-out of small arms and igniters during open burn procedures. It is unlikely that any live UXO will be encountered. However, UXO HTRW/construction support procedures will be employed to substantially reduce any risk of such an occurrence. No visible evidence of the caged burn container. Miscellaneous debris was identified during investigations during a 2001 waste delineation.

It is anticipated that 60 cyds of soil will be removed from IR Site 6. The area to be removed will consist of an approximately 20-foot diameter circle, centered around sample SJS05-SS29 at an approximate depth of 3 to 4 feet.

At Site 3 up to 2200 cubic yards is anticipated to be excavated and removed for disposal. These spoils at Site 3 are being removed because of the prior disposal practices of waste deposited at the former landfill consisting of mixed materials containing solvents, acids, bases and mixed municipal waste. A remote possibility exists for encountering UXO therefore the soils at this site are to be screened. The excavation at Site 3 is to be to a depth of approximately 3 to 5 feet below grade. The same UXO HTRW construction support procedures are to be employed during remedial activities at Site 3.

3.0 OBJECTIVES

The objective of this UXO support is to ensure that the soils and waste removed from Sites 6 and 3 during excavation activities are free from hazardous OE/UXO and that any OE/UXO residue is safely demilitarized, managed, and available for turn-in to the local Defense Reutilization Materiel Office. It is also the intent to prevent site workers from accidentally coming into contact with UXO and for delineating the methods that the UXO technician will use if OE/UXO is encountered.

4.0 UXO SUPPORT PLAN

All site workers during remedial excavation operations at Sites 6 and 3 will follow these OE/UXO support procedures.

4.1 UXO PERSONNEL

As required by EP 75-1-2, UXO Support during HTRW and Construction Activities, two UXO personnel will be designated by the Shaw E & I, OE Service Center. Their responsibilities are specifically delineated in that document. One will be a qualified Senior UXO Supervisor (SUXOS) and one will be a qualified UXO Technician III in accordance with CEHNC EP 1110-1-18.

4.2 UXO TRAINING

It is imperative that all site personnel be briefed on OE. The SUXOS will conduct an Explosive Ordnance Recognition briefing to other members of the field crew prior to conducting intrusive excavations operations at Sites 1, 6 and 3. Training will consist of describing basic UXO characteristics, identification, and safety precautions. The Site Safety Officer (SSO) will not present the initial training unless he/she is a qualified UXO technician to avoid the possibility of conveying inaccurate information on UXO items.

4.3 OE/UXO SUPPORT PROCEDURES

The UXO technicians will be present at all excavations at Sites 1, 6 and 3 to visually locate and identify potential UXO items.

A mechanical screen with 1- inch mesh will be used to sift all soil removed from the site by the excavator. The excavator will have a 1 inch thick plexiglas blast shield affixed to the window to provide protection for the operator. The mechanical screen will also have a 1 inch thick plexiglas blast shield positioned to afford the screen operator protection and provide visibility to the operation of the equipment.

4.3.1 One UXO technician will observe the excavation operation by standing in a safe area to the side of the excavator outside of the swing radius. He will be responsible for examining the face of the excavation and the material as it is removed from the pit and placed in the power screener. The UXO technician will take advantage of natural or placed protective structures to shield himself from the potential hazard of falling or projected debris.

4.3.2 The other UXO technician will stand behind a protective 1-inch thick plexiglas blast shield and control the screening operation.

4.3.3 The UXO technicians will communicate with the excavator operator via hand signals to stop the excavation if possible OE is encountered When signal by either UXO technicians, the excavator operator will immediately place the excavator bucket on the ground and shut down the excavator. The UXO technician will then examine the item to determine if it is UXO.

4.4 OE REMOVAL, DEMILITARIZATION, AND DISPOSAL

If a suspected UXO item is encountered, the UXO team will positively identify the item and determine its condition. If the item is determined hazardous or its condition is unknown, the UXO team will establish an Exclusion Zone (EZ) based on the quantity distance (Q-D) arc for the munition to protect the site workers from exposure to the UXO hazards. The EZ will encompass the area of activity and will have access and egress control. Only UXO support personnel and safety specialists will be authorized for unescorted access in the EZ. All UXO work activities will cease immediately if non-UXO or unauthorized personnel enter the EZ.

4.4.1 UXO Safe to Move

When UXO has been found and determined safe to move, the UXO team will remove the item from the excavation area to a container such as a 55-gal drum in a safe holding area on site. This area will be located close to the site but at a distance sufficient so as not to interfere in ongoing operations. The RPM and ROICC will be notified immediately and the ROICC will notify Explosive Ordnance Disposal (EOD) Mobile Unit (MU) Two Detachment Norfolk by calling the Norfolk Emergency Communication Center at 757-444-2324, if necessary. Material requiring off-site removal will be separated into piles according to material makeup and disposal destination. All OE Scrap will be turned into the DRMO at St Julien's Creek after it has undergone the Demilitarization and inert certification process described in attachment A.

4.4.2 UXO Not Safe to Move

Hazardous UXO items that are either unsafe to move or whose condition is unknown will be marked by brightly colored flagging tape. The RPM and ROICC will be immediately notified. All excavation activities will stop and a UXO EZ will be established based on the Q-D arc for the munition described by OP5. Only EOD/UXO qualified personnel or those designated by the ROICC will be allowed in the EZ without a safety escort. The UXO team will notify Shaw E & I site management personnel of the type and hazard of the UXO located and marked. The ROICC will notify Explosive Ordnance Disposal (EOD) Mobile Unit (MU) Two Detachment

Norfolk through the Emergency Communication Center 757-444-2324. They will be told that an EOD emergency exists according to the guidelines of the Munitions Rule that requires their response.

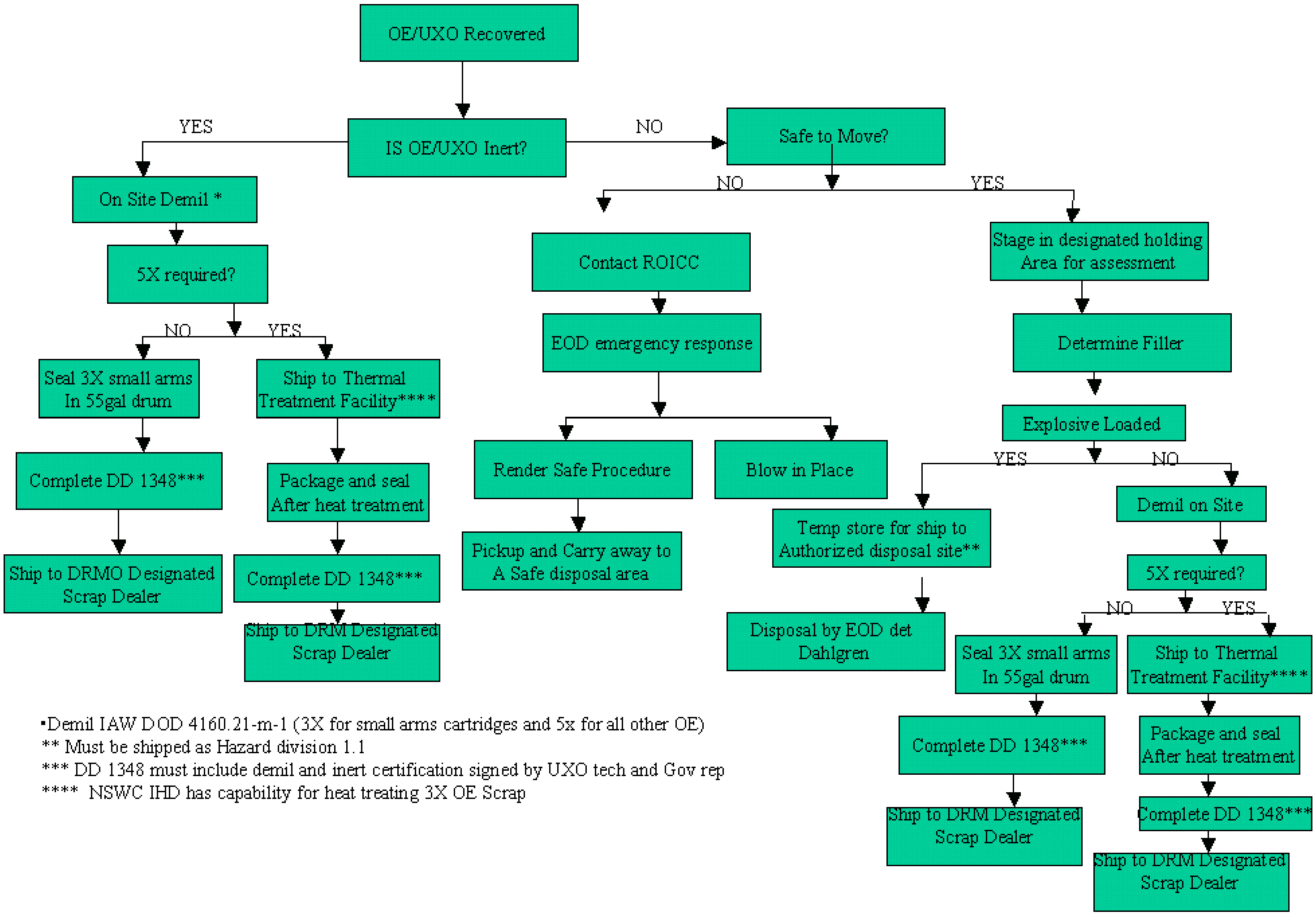
4.4.3 QUALITY CONTROL

The Supervisor Unexploded Ordinance Technician (SUXOS) will also act as the on-site UXO Quality Control (QC) Specialist. He will perform site QC inspections as a collateral duty. He will inspect certification and demilitarization documentation for compliance with QC documentation standards.

4.4.4 OE Process

The following flow diagram depicts the process of OE recovery and disposal.

Recovery /Disposal Of OE



•Demil IAW DOD 4160.21-m-1 (3X for small arms cartridges and 5x for all other OE)
** Must be shipped as Hazard division 1.1
*** DD 1348 must include demil and inert certification signed by UXO tech and Gov rep
**** NSWC IHD has capability for heat treating 3X OE Scrap

5.0 SITE SAFETY AND PERSONAL PROTECTIVE EQUIPMENT

UXO personnel performing work at Sites 1, 6 and 3 will follow the Site Specific Health and Safety Plan (SSHASP) presented as part of the basic Work Plan. Exceptions to the SSHASP are as follows for the UXO personnel:

- Safety boots will be worn during UXO support operations
- Hard hats will not be worn unless an overhead hazard exists. Hard hats may create an unsafe condition by falling off of the head of a UXO technician at a critical moment.

Otherwise, personal protective equipment (PPE) may be worn by Shaw UXO personnel in accordance with the guidance in the referenced document. For this task, Level "D" PPE modified to include non-steel toed protective boots and to eliminate the requirement for wearing a hard hat if no overhead hazard is present. Both of these modifications comply with the requirements of the CEHNC's EP 385-1-95a *Basic Safety Concepts and Considerations for OE Operations* (June 2001).

A Shaw SSO will work with the UXO team to ensure that the requirements of the SSHASP are followed and that the UXO technician conducts a review of the Activity Hazard Analysis (AHA).

(ATTACHMENT A)

UXO RELATED SCRAP METAL COLLECTION AND INSPECTION PROCEDURES
FOR
UXO SUPPORT AT ST. JULIEN'S CREEK ANNEX
CHESAPEAKE, VIRGINIA

Table of Contents

1.0 Purpose

This SOP is intended to guide Shaw Environmental, Inc. UXO Technicians in the safe and efficient handling and disposal of ordnance explosives (OE)/unexploded ordnance (UXO) related scrap metal found at Shaw Environmental, Inc. project sites. The inherently dangerous characteristics of Ammunition Explosives Dangerous Articles (AEDA) dictate that special precaution be taken to ensure that demilitarization is performed only by properly trained and technically qualified personnel. This procedure is general in nature and may contain more information (i.e., on-site detonations) than is required for this project. UXO items that are determined to be inert will be demilitarized on site. Other items such as safe-to-move and unsafe-to-move will either be shipped off site for disposal (safe-to-move) or remain in place and notification made to Resident Officer in Charge of Construction.

2.0 Background

The procedures below are designed to reduce the potential pitfalls of improperly handling (co-mingling of hazardous and non-hazardous scrap) OE scrap items.

References

DoD 4160.21-M	Department of Defense Reutilization and Marketing Manual
DoD 4160.21-M-1	Department of Defense Demilitarization Manual
TB 700-4	Department of the Army Technical Bulletin - Decontamination of Facilities and Equipment

3.0 Collection Procedures

At the operating site, Shaw Environmental, Inc. will preposition two scrap metal containers. One container will be marked "Non-OE Scrap Metal" and will be used to collect general metal debris. The other container will be marked "Ordnance Related Scrap Metal" and will be used to collect nonhazardous ordnance related scrap metal (i.e. Metal components that do not contain any explosives or other hazardous materials). All small arms will be visually inspected and certified inert. Any other OE scrap will be visually inspected and certified 5X.

A UXO technician will examine any inert OE or metal removed from the site and categorize it as OE or non-OE Scrap. The item will then be placed in one of the two designated separated piles.

Prior to any movement of OE/UXO the following disposition procedures will be followed:

- OE/UXO determined to be inert by exterior and interior inspection by UXO Technicians will be demilitarized on site. UXO Technicians will ensure that each meets the Department of Defense (DoD) demilitarization standards indicated in subsequent paragraphs. Only inert certified and demilitarized items will be provided to the local DRMO.

- Ordnance items that are considered safe to move but cannot be confirmed to be explosive free by UXO Technicians will be removed from the immediate work area and temporarily stored in a safe holding area on site. These items will be accounted for, controlled, and inventoried periodically. Safe-to-move ordnance will not be stored over 90 days. If required; (The ROICC/RPM will be immediately notified), arrangements will be made with an explosive transportation company to transport ordnance items that require explosive venting procedures to the designated activity.

- Ordnance that is considered not safe to move by UXO Technicians will be left in place, marked with wooden stakes and bright flagging tape. Work will cease in the immediate area of the discovered hazardous ordnance. The Senior UXO Technician on site will make a determination on the safe distance in which site work activities can continue, depending on the type of ordnance found. The Senior UXO Technician will notify the site safety officer and project management personnel of the type of ordnance encountered and its safety precautions. The ROICC/RPM will be immediately notified. The Norfolk Emergency Communication Center (ECC) will be contacted at 757-444-2324 for EOD assistance.

4.0 Removal and Segregation of Scrap Metal

The OE related scrap will be inspected and divided into two groups: 1) OE related scrap requiring further demilitarization; and 2) OE related scrap that does not require further demilitarization.

The UXO Supervisor will inspect the OE scrap piles and direct that they be placed in the OE scrap collection container according to group. For purposes of disposal, UXO items shall be segregated and defined as Group 1a, Group 1b, or Group 2.

4.1 Group 1 Scrap Metal

Group 1 includes property that previously contained explosives or that does not contain items of a dangerous nature and can be certified inert and/or free of explosives or other dangerous materials such as targets, certain expended ordnance, etc.

4.1.1 Group 1a Scrap Metal

Group 1a includes firing range expended small arms cartridge and inert metals. Metals include material for which the only use is for its basic material content (e.g. clean shrapnel, target metal, etc.) and does not include material with any residual utility or capability or that is considered to be Munitions List Items (MLI) or Commerce Control List Items (CCLI). Such material is eligible under the Resource Recovery and Recycling Program for disposition by a Qualified Recycling Program (QRP) in accordance with DoD 7514.1, Pollution Prevention. DoD Components may exercise direct sale authority for firing range expended small arms cartridge cases provided that it is crushed, shredded or otherwise destroyed prior to release from DoD control.

4.1.2 Group 1b Scrap Metal

Group 1b includes any certifiable material or item not meeting the criteria in 1a above. A determination shall be made as to whether the material/item requires demilitarization. Damage sustained to a UXO item does not necessarily constitute demilitarization. Destruction shall, at a minimum, satisfy the provisions of DoD 4160.21-M-1. This material is not eligible for a QRP.

4.2 Group 2 Scrap Metal

Group 2 includes inherently dangerous items that may potentially contain munitions residue and cannot be certified as inert, such as practice bombs.

5.0 Disposition of Munitions List Items

Demilitarization should be accomplished by the most cost effective method consistent with adequate security and surveillance as practical in accordance with existing environmental standards, safety and operational regulations, to the point of assuring freedom from explosives, toxic or incendiary materials, smoke content or design hazards

5.1 Assignment of Demilitarization Codes

The proper procedure requires that OE scrap be assigned a demilitarization code and that code determines the type of processing required. For almost all OE scrap the assigned code should be "G". Assignment of this code is the responsibility of the generating activity.

Definition of Demilitarization Code "G":

"G" MLI -- Demilitarization required - ADEA, Demilitarization, and if required, declassification and/or removal of sensitive markings or information, will be accomplished prior to physical transfer to a DRMO. This code will be used for all ADEA items, including those, which also require declassification and/or removal of sensitive marking or information. [When in doubt assign Demilitarization Code G for all recovered OE related scrap.]

5.2 Demilitarization Requirements

Demilitarization and decontamination of OE scrap is based on a system that assigns decontamination levels commensurate with the post treatment use. For metal that is being released to the public as recyclable, 5X is the acceptable degree of decontamination.

Three Xs indicate the equipment or facilities (in this case OE scrap) have been examined and decontaminated by approved procedures and no contamination can be detected by appropriate instrumentation, test solutions, or by visual inspections on easily accessible surfaces or in concealed housings, etc. and are considered safe for the intended use. Items decontaminated to this degree cannot be furnished to qualified DoD or Industry users or subjected directly to open flame cutting, welding, high temperature heating devices), or operations which generate extreme heat, such as drilling and machining. Newly implemented certification procedures require two signatures for certification, of which only one signature may be from a government contractor if demilitarized or decontaminated items are to be hauled off site as scrap.

The only acceptable way to get to 5X decontamination is by partial or complete removal, neutralization, or destruction of explosives/explosive residue by flashing, steaming, neutralization, or other approved desensitizing methods such as shredding. This is often expensive and nullifies the value of the scrap. However to leave OE scrap on a site increases the possibility of residues such as RDX, HBX, and TNT entering the ground water and causing a more expensive problem.

5.2.1 Ammunition - Method and Degree of Required Demilitarization

- **Artillery/Mortar Ammunition Components and Similar Items of All Types** including but not limited to high explosive, practice, inert loaded, incendiary, and smoke fillers. Remove explosive filler from projectile (wash out, burn out, etc.). Remove rotating band and deform fuze cavity threads or score or deform bourrelet or gas check band. Burn propellant unless otherwise instructed to retain for sale or other purposes. Deform fin assembly threads or fin blades. Cartridge cases will be deformed by off-center punch-out of primer or split case neck or puncture the lower sidewall with a minimum of 3/4 inch hole or deform lower sidewall, which will prevent chambering, or crush or press. Burn out smoke mixture or detonate smoke canister.

- **Inert Loaded Ammunition, Projectiles, and Similar Items of All Types** loaded with inert filler to simulate service item. Remove rotating band from artillery projectiles and open the closure of the projectile body to expose the inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent reloading or resealing.

  NOTE: For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning. Melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to expand and burst sealed casings. For this reason, DRMOs will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler may be exposed by removal of the fuze well from the cavity, removal of base plates, or by puncturing/drilling holes in the bomb casing.

- **Category III Ammunition and Components Which Have Been Fired or Expended and Other Non-Explosive Items.** All items will be rendered free of energetic materials prior to accomplishment of demilitarization. Range residue will be processed in accordance with the defense Material Disposition Manual, DoD 4160.21-M, Chapter 4, paragraph B.3, after all required demilitarization is accomplished.

- **Artillery/Mortar Ammunition Components and Similar Items of All Types.** Remove rotating band and deform fuze cavity threads or score or deform bourrelet or gas check band. Score practice round with a torch, displacing a minimum of one cubic inch of metal or shear into two pieces. Deform fin assembly threads and fin blades.
- **Inert Loaded Ammunition, Projectiles, and Similar Items of All Types** loaded with inert filler to simulate service item. Remove rotating band from artillery projectiles and open the enclosure of the projectile body to expose the inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent relocating or resealing. **NOTE:** For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning, melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to expand and burst sealed casings. For this reason, DRMOs will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler may be exposed by removal of the fuze well from the cavity, removal of base plates, or by puncturing/drilling holes in the bomb casing.

- **Other Nonexplosive Filled Items** that perform a major function essential to the basic mission of the end item. Cut, crush, or process through a deactivation furnace. Burn or cut cartridge case lines and propelling charge bags. Cut, burn, or crush aircraft and ground signal cases. Crush or detonate piezoelectric (lucky) elements.

5.2.2 Category V. Military Explosives, Solid and Liquid Propellants, Bombs, Mines, Incendiary Agents, and Their Constituents - Method and Degree of Required Demilitarization

- **Artillery/Mortar Ammunition Components and Similar Items of All Types** including but not limited to high explosive, practice, inert loaded, incendiary, and smoke fillers. Remove explosive filler from projectile (wash out, burn out, etc.). Remove rotating band and deform fuze cavity threads or score or deform bourrelet or gas check band. Burn propellant unless otherwise instructed to retain for sale or other purposes. Deform fin assembly threads or fin blades. Cartridge cases will be deformed by off-center punch-out of primer or split case neck or puncture the lower sidewall with a minimum of 3/4 inch hole or deform lower sidewall, which will prevent chambering, or crush or press. Burn out smoke mixture or detonate smoke canister.

- **Inert Loaded Projectiles, Warheads and Similar Items of All Types** loaded with inert filler to simulate service item. Remove fuze and/or spotting charge, where applicable, and burn or detonate. Remove rotating band from artillery projectiles and open the enclosure of the projectile body to expose inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent reloading or resealing.

- **Bombs and Similar Items of All Types,** including but not limited to high explosive, practice, inert loaded, incendiary and photo flash fillers, military explosive excavating devices, demolition blocks, and grenades. Demilitarization will be accomplished by removal of explosive filler in an approved manner (e.g., wash-out, burn-out, etc.) And by deforming fuze cavity threads or removing base plate by other than normal disassembly (such as sawing) or by detonation. Grenades will be demilitarized by cutting or crushing (a minimum of 75% compression) the grenade body after item has been defuzed and explosive removed or by detonation.

- **Small Explosive Items**, including but not limited to fuzes, boosters, primers, detonators, firing devices, ignition cartridges, blasting caps, grenade cartridges, tracer assemblies, and similar components. Demilitarization can be accomplished by processing through a deactivation furnace at settings of 1150 degrees at burner end and 450 to 500 degrees at stack end or by mutilation. Incendiary projectiles will normally be decored to expose and assist in the compete burning of the incendiary composition. Where decoring of projectile is not necessary, processing through the deactivation furnace is adequate. Burn out 20mm high-explosive (HE) projectiles by processing through the deactivation furnace or detonate. Processing complete small arms ammunition cartridges, all calibers, through the deactivation furnace at controlled temperatures will result in adequate demilitarization. Fuzes and boosters can be disposed of by disassembly and cutting, drilling, or punching to deform metal parts. Explosive components generated through disassembly are to be burned or detonated. Fuzes may also be processed through a deactivation furnace as a complete item when disassembly is not feasible. For grenades demilitarization may be accomplished by removal of explosive components by crushing, cutting, breaking, melting, burning, or otherwise to fully preclude their rehabilitation or further use as grenade components. Demilitarization may also be accomplished by detonation or burning as appropriate for the particular item involved.

- **Rocket Motors, Warheads, Components and Similar Items of All Types,** including high explosive, inert, loaded, practice and smoke. Wash out or burn out rocket warhead filler and mutilate casing by crushing or cutting by torch and deforming threaded area. Disassemble and remove or burn out rocket motor propellant and cut or crush case, and deform threaded area of cases. Rocket motors and warheads may also be detonated.

- **Mines, Anti-Personnel/Anti-Tank Explosive, Components and Similar Items of All Types** including high explosive, practice, inert loaded associated explosive components. Wash out or burn out filler and mutilate by crushing, cutting by torch, deforming threaded area or detonate. Process mine fuzes, activators, and firing devices through a deactivation furnace, burn in a cage or detonate. Mine firing such as the M56 or M61 types should be crushed, cut, or burned.

- **Ammunition and Components Which Have Been Fired or Expended and Other Non-Explosive Items.** All items will be rendered free of energetic materials prior to accomplishment of demilitarization. Range residue will be processed in accordance with the defense Material Disposition Manual, DoD 4160.21-M, Chapter 4, paragraph B.3, after all required demilitarization is accomplished.

  - **Artillery/Mortar Ammunition Components and Similar Items of All Types** including but not limited to high explosive, practice, inert loaded, incendiary, and smoke fillers. Remove explosive filler from projectile (wash out, burn out, etc.). Remove rotating band and deform fuze cavity threads or score or deform bourrelet or gas check band. Score practice round with a torch, displacing a minimum of one cubic inch of metal or shear into two pieces. Deform fin assembly threads and fin blades. Defective cartridge cases will be deformed by off-center punch-out of primer or split case neck or puncture the lower sidewall with a minimum of ¾ inch hole or deform lower sidewall, which will prevent chambering, or crush or press. Burn out smoke mixture or detonate smoke canister.

  - **Inert Loaded Ammunition, Projectiles, and Similar Items of All Types** loaded with inert filler to simulate service item. Remove rotating band from artillery projectiles and open the enclosure of the projectile body to expose the inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent relocating or resealing. **NOTE:** For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning, melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to expand and burst sealed casings. For this reason, DRMOs will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler may be exposed by removal of the fuze well from the cavity, removal of base plates, or by puncturing/drilling holes I the bomb casing.

  - **Bombs and Similar Items of All Types**, including but not limited to high explosive, practice, inert loaded, incendiary and photoflash fillers, military explosive excavating devices, demolition blocks and grenades. Demilitarization will be accomplished by deforming fuze cavity threads or removing base plate by other than normal disassembly (such as sawing) or by detonation. Grenades will be demilitarized by cutting or crushing (a minimum of 75% compression) the grenade body after item has been defuzed and explosive removed or by detonation.

  - **Rocket Motors, Warheads, Components and Similar Items of All Types**, including high explosive, inert loaded, practice and smoke. Demilitarize casing by crushing or cutting by torch or deforming threaded area. Cut, crush case, or deform threaded area of rocket motor cases.

- **Mines, Anti-Personnel/Anti-Tank, and Similar Items of All Types** including high explosive, practice, inert loaded and associated components. Demilitarize casing by crushing, or cutting by torch, and deforming threaded area or detonate. Mine firing devices such as the M56 or M61 types should be crushed, cut, or burned.

- **Instructions For Specific Ordnance Items:**

  - **BDU-50 Practice Bomb:**

    a. Each bomb must be inspected by qualified EOD/UXO personnel to ensure that bombs are BDU-50s and that the bomb is expended. If the EOD/UXO personnel cannot verify both fuze wells, or absence thereof, it must be op-opened remotely by detonation.

    b. A 1/4-inch hole will be punched in each of the two spanner wrench receptacles, fracturing the metal to a depth in excess of 1/10 inch into the concrete filler material.

    c. A 1/4-inch punch will be utilized to further damage the threads of the nose plate, ensuring that the plate cannot be removed and replaced.

    d. Fins will be deformed or broken and paint will then be used to place a mark of contrasting color on the bomb or near the nose.

- **Technical data** will be demilitarized by burning, shredding, or pulping.

5.2.3 Venting of OE Related Scrap

Prior and current practices have taken this to mean that if the OE item is intact and resembles a piece of military ordnance, such as a 105mm High-Explosive Anti-Tank (HEAT) (Practice) projectile, it should have a hole punched through the side to expose the filler as non-explosive. This is typically accomplished through the use of a shape charge attack. The explosively created hole exposes the filler and disfigures the projectile so that it could not be used again. For a 105mm HEAT (Practice) round this approach is sufficient because the projectile never contained any explosives or energetic material used as a spotting charge. For a MK- 82 Low Drag General Purpose (LDGP) Bomb (Practice) this approach may not be sufficient because the bomb can contain various types of explosively activated spotting charges that have the capability to cause injury or death if exposed to the right elements such as flame from a cutting torch. And there is always the possibility that a shape charge attack may punch a hole in an explosive ordnance item exposing the filler but not causing a detonation. Because some explosive fillers look like inert fillers the possibility for mis-identification and improper certification is real.

UXO known or suspected to be inert (filled with an inert substance to simulate the weight of an explosive filler) will be explosively vented with conical-shaped charges. For the purpose of determining the fragmentation hazard area for explosive venting, it will be assumed that the UXO has an explosive filler and that a high-order detonation will occur. Venting will be considered successful when the inert filler is exposed. The vented inert ordnance item can be treated and disposed as scrap after the venting and demilitarization process is complete.

6.0 Certification/Disposal of Scrap Metal

Shaw E & I will ensure that the quantities of demilitarized property turned in to the DRMO are accurate and that these quantities are readily verifiable by the DRMO. All OE Scrap will be accompanied with a Department of Defense (DD) Form 1348-1A contains the demilitarization code. In addition Shaw E & I will issue a letter specifying who is authorized to sign the statement of inert certification. This letter will be kept in the project files, at the local DRMO, and with Shaw E & I.

Prior to release of the material, the Senior UXO Supervisor will physically inspect the material in the containers to ensure that they are free of dangerous items or conduct demilitarization operations. The Senior UXO Supervisor will sign the certificate, typed on the DD Form 1348-1A, which states:

"I certify that the property listed hereon has been inspected
by me and, to the best of my knowledge and belief, contains
no items of a dangerous nature."

or

"I certify that (identify items) were demilitarized in accordance
with cite specific instructions (Appendix and Item number)
that were complied with in the DoD 4160.21-M-1
and other applicable regulations."

The certification will be verified (countersigned) by a technically qualified U.S. government representative (U.S. citizen) designated by the responsible commander/generating activity.

Scrap will be segregated into like metals (mainly steel, aluminum, and mixed metal) and placed into pelletized wooden shipping boxes. Each item placed into an inert-certified box will be inspected. The boxes will be filled, the covers will be nailed on, and a lead seal will be affixed. A Statement of Inert Certification will then be attached to the box. The box can then be picked up by a local scrap yard for disposal or recycling.

UXO Personnel Contact List

Organization	Contact
EOD Mobil Unit II Detachment Norfolk	AOIC Senior Chief Baron (757) 445-2750
DRMO Norfolk	Mr. Wallace (757) 444-5115
DRMO St. Julians Creek Annex Building 400 Magazine Road Portsmouth VA 23709	Ms. Knowles (757) 396-0137 ext. 12

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

1	2	3	4	5	6	7	23	24	25	26	27	28	29	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DOC	IDENT		RI FROM			M&S	UNIT	ISS	QUANTITY					SER	SUPPLE-MENTARY ADDRESS					SIG	FUND		DIS-TRI-BU-TION			PRO-JECT			PRI		REQD	DEL	DATE	ADV		RI			O/P	COND	MGT		UNIT PRICE DOLLARS					CTS	

1. TOTAL PRICE

DOLLARS	CTS

2. SHIP FROM

3. SHIP TO

4. MARK FOR

5. DOC DATE	6. NMFC	7. FRT RATE	8. TYPE CARGO	9. PS

10. QTY. REC'D	11.UP	12. UNIT WEIGHT	13. UNIT CUBE	14. UFC	15. SL

16. FREIGHT CLASSIFICATION NOMENCLATURE

17. ITEM NOMENCLATURE

18. TY CONT	19. NO CONT	20. TOTAL WEIGHT	21. TOTAL CUBE

22. RECEIVED BY	23. DATE RECEIVED

24. DOCUMENT NUMBER & SUFFIX (30-44)

25. NATIONAL STOCK NO. & ADD (8-22)

26. RIC (4-6)
UI (23-24)
QTY (25-29)
CON CODE (71)
DIST (55-56)
UP (74-80)

27. ADDITIONAL DATA

PREVIOUS EDITION MAY BE USED

PerFORM (DLA)

Reset

(8) Inspection/Certification

(a) The generating activity shall ensure that this property is properly inspected to determine the presence or absence of explosive hazards prior to referral to the DRMO or release from DoD control. The inspection shall be performed by AEDA technicians or other technically qualified personnel as designated by the generating activity. Commercial contractors responsible for certifying AEDA residue, Range Residue or ECP must possess qualifications equal to those of technically qualified DoD personnel. The personnel certifying and verifying the inspection shall certify on the **DTID**, as follows:

statement

"This certifies and verifies that the AEDA residue, Range Residue and/or Explosive Contaminated property listed has been 100 percent properly inspected by us and to the best of our knowledge and belief, are inert and/or free of explosives or other dangerous materials."

(b) Inert certifications require dual signatures. The first signature (certifier) may be either qualified DoD personnel or qualified contractor personnel. The second signature (verifier) must be a technically qualified DoD person, and U.S. citizen.

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(c) The certification and verification signatures must be directly above the typed or clearly stamped or legibly printed full name, rank/rate, complete organization name and address, and phone number (commercial and DSN) of the personnel that certified and verified the inspection. Each generating activity shall ensure that its servicing DRMO has a current list of the personnel and their sample signatures who are qualified and authorized to inspect, certify and verify AEDA Residue, Range Residue and ECP.

(d) Material which cannot be certified as above will be treated as ECP or Group 2 Range Residue.

(e) The generating activity will provide quality assurance inspection, certification/verification and, where appropriate, venting of individual ordnance items by the Military Service Explosive Ordnance Disposal (EOD) personnel. Military Service EOD standards or U.S Army Corps of Engineers standards, at a minimum, will be used/met prior to release of any ordnance or ordnance residue from DoD control.

(f) Incidents in which a certification is found to be incorrect will be fully investigated and appropriate administrative or punitive actions taken.

(9) Generating activities and DRMOs shall utilize the Memorandum of Agreement (MOA) (Attachment 3) for in-place sales.

(10) Material covered under the preceding paragraph B3a. is also subject to the provisions

DEPARTMENT OF THE NAW
SPECIAL BOAT UNIT TWENTY
2220 SCYOFIELO ROAD STE 200
NORFOLK VA 23521-2845

3571
Ser N8/0045
21 JAN 99

From: Commanding Officer, Special Boat Unit TWENTY
To: Defense Reutilization and Material Office, Post Office Box 15068, Norfolk, VA 23511

Subj: INERT CERTIFICATION AUTHORIZATION SIGNATURE LIST

1. The personnel listed below are qualified to inspect and certify property as being inert:

Verifiers SSN.

DCCS Charles J. Ballard, [redacted] Sample Signature

BMCS Howard L. Kuehne, [redacted] Sample Signature

Certifiers Below

GM1 John L. Rieffer, [redacted] GM1 (SW/CC) Sample Signature

QM1 John C. Raymond, [redacted] Sample Signature

GM1 Anthony R. Quattro, [redacted] GM Sample Signature

GM1 David L. Durrett, [redacted] Sample Signature

2. The above named personnel understand that CRMO shall accept custody of fired cartridge cases only when this activity furnishes a signed certification stating that the material has been inspected and that it contains no live rounds, unfired prlmors, explosives, or other danger material.

3. My point of contact is QM1 Raymond at commercial (757) 162-7471.

W. S. BRINKMAN

EXAMPLE Only
DRMO Need Original Letter