5/1/08 - 002138

Final Work Plan
SWMU-14 Asphalt Cover-Removal Action
Naval Station Norfolk
Norfolk, Virginia

Prepared for:
Department of the Navy
Mid-Atlantic Division
Naval Facilities Engineering Command

Prepared by:
Shaw Environmental, Inc.
500 E. Main Street, Suite 1630
Norfolk, Virginia 23510

Contract No. N62470-02-D-3260
Task Order No. 0120
Project 129893
May 2008

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Project No. 129893
May 28, 2008

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LIST OF ACRONYMS

CPR	Contractor Production Report
EE/CA	Engineering Evaluation / Cost Analysis
E&S	Erosion and Sedimentation
FEAD	Facilities Engineering & Acquisition Department
HDPE	High-density Polyethylene
H&S	Health and Safety
HWAA	Hazardous Waste Accumulation Area
IEEE	Institute of Electrical and Electronics Engineers
MPR	Monthly Progress Report
NAVFAC	Naval Facilities
NFPA	National Fire Protection Association
NSN	Naval Station Norfolk
NTR	Naval Technical Representative
NTCRA	Non-Time Critical Removal Action
PCB	Polychlorinated Biphenyls
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
PM	Project Manager
POC	Point of Contact
PWD	Public Works Department
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
RCRA	Resource Conservation and Recovery Act
RPM	Remedial Project Manager
SAA	Satellite Accumulation Area
Shaw	Shaw Environmental, Inc.
SOW	Statement of Work
SSHSP	Site Specific Health & Safety Plan
SSO	Site Safety Officer
SVOC	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Unit
TO	Task Order
VADEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compounds
WP	Work Plan

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw) has been contracted by the Department of the Navy, Atlantic Division, Naval Facilities Engineering Command, to provide removal services for Solid Waste Management Unit (SWMU) 14 at the Naval Station Norfolk (NSN) located in Norfolk, Virginia. This work plan describes in detail the tasks to be performed and the techniques that will be employed to complete this non-time critical removal action (NTCRA) at SWMU-14.

1.1 PROJECT LOCATION AND BACKGROUND

Naval Station Norfolk is the largest naval base in the United States and is situated in the northwest portion of the City of Norfolk, Virginia. An installation location map is provided as **Figure 1**. SWMU-14 is a 13.2 acre site located in the northeast corner of NSN, adjacent to Willoughby Bay (**Figure 2**). The site consists of a concrete storage pad (Q-50 Satellite Accumulation Area (SAA)) surrounded by a grass covered field.

The concrete storage pad served as a less than 90-day hazardous waste accumulation area (HWAA) for processing (sampling, identifying, labeling, packaging) of various waste streams prior to eventual transport and disposal. In addition to this accumulation area, the peninsula at NSN (formerly Sewell's Point) is a man-made landmass formed from two distinct periods of filling activities. The first landfill activities began in the early 1950's when the channels were dredged to allow for construction of the northern most series of piers at the site. The resulting dredge material was used to create much of the land at Sewell's Point. The second period of filling occurred between 1974 and 1978 when the eastern portion of the site was formed from the disposal of construction debris. This landfill was later designated as Site 9, Q-Area landfill, and reportedly used for the disposal of non-hazardous construction debris. Site 9 was originally designated as "No Further Action". However, because Site 9 and SWMU-14 are co-located, the Site 9 soil and groundwater were evaluated to determine the potential impact of contamination from SMWU-14. Based on this, it was determined that due to the presence of dredge material, soil, and construction debris, the soil had been impacted by volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and dioxins/furans.

Based on the Engineering Evaluation/Cost Analysis (EE/CA) (CH2M HILL, November 2007), alternative 3 – asphalt cover (parking lot) was the recommended removal action alternative to most effectively mitigate potential human health risk associated with contaminated soil resulting from past activities at SWMU-14.

1.2 PROJECT OBJECTIVES AND SUMMARY OF WORK

The objective of this Task Order (TO) is to perform the necessary removal activities to mitigate the potential for human exposure to contaminants in the soil at SWMU-14. Shaw will be performing *Alternative #3: Asphalt Cover (parking lot)* as described in the EE/CA (CH2M HILL, November 2007). This will include tasks such as: pre-construction activities, mobilization and site set-up, site remediation, site restoration, demobilization, and post construction submittals.

Based on physical conditions at the site and the project objectives, Shaw has developed a list of key activities which include:

- Pre-construction activities
  - Plan preparation and submittal
  - Procurement activities
  - Shaw and subcontractor personnel security clearance
  - Pre-construction meeting
  - Waste disposal characterization & analysis
- Mobilization and site preparation
  - Utility clearance
  - Receive temporary facilities and equipment
  - Site set-up
  - E&S control installation
- Site remediation activities
  - Monitoring well protection /modification
  - Initial grading
  - Installation of permanent drainage controls
  - Installation of underground conduit and light pole concrete footers
  - Installation and preparation of subgrade and aggregate base materials
  - Asphalt cover placement
  - Installation of parking lot lighting
  - Transportation and disposal
- Site restoration
  - Landscaping and vegetation repair
  - Parking lot striping
  - Removal of temporary E&S controls
  - Final as-built survey
- Site teardown and demobilization
- Post-construction submittals

Details of these activities are discussed in Section 3 of this work plan.

1.3 PROJECT SCHEDULE

Activity-specific timelines and critical paths are presented in **Appendix A**, "Project Schedule". The schedule sequencing shown may be modified in the field based on weather conditions. Shaw anticipates commencing work at SWMU-14 in May 2008.

1.4 PLAN ORGANIZATION

The remainder of this Work Plan is organized as follows:

- **Section 2:** Addresses project management and planning,
- **Section 3:** Describes activities that will occur to meet the project objectives,
- **Appendix A** Project Schedule,
- **Appendix B** Construction Drawings,
- **Appendix C** Health and Safety Plan,
- **Appendix D** Quality Control Plan,
- **Appendix E** Environmental Protection Plan,
- **Appendix F** Field Sampling & Analysis Plan,
- **Appendix G** Erosion and Sediment Control Plan, and
- **Appendix H** NAVFAC Spill Response SOP (March 2006).

2.0 PROJECT MANAGEMENT & PLANNING

Project management tasks will include preparation of the Work Plan (WP) and Site Specific Health and Safety Plan (SSHSP), project cost controls and scheduling, contract procurement and administration, and management of field personnel. This Work Plan delineates the work methodology and requirements for performing the contract activities, deliverables, and other pertinent project-specific information.

2.1 PROJECT TEAM

Key Shaw personnel involved in the successful completion of this project include the Project Manager, Site Superintendent, Project Engineer, Site Quality Control (QC) Manager, Site Safety Officer (SSO), and the Health and Safety Manager. In addition, various subcontractors and vendors will be used to supply the remaining services and materials needed for project completion. Key personnel for this Task Order are listed below in **Table 2-1.**

Table 2-1 SHAW PROJECT MANAGEMENT PERSONNEL

Project Title	Name	Contact Information
Project Manager	Mark Pisarcik	mark.pisarcik@shawgrp.com (757) 640.6936 (o) (757) 544.2085 (c) Shaw Environmental, Inc. 500 E. Main Street, Suite 1630 Norfolk, VA 23510
Site Superintendent	Rich Kilmer	(716) 940-1439
Site QC Manager	Louie McTall	(757) 640-6951
Project Engineer	Louie McTall	(757) 640-6951
Site Safety Officer	Rodney Alexander	
Health and Safety Manager	Kym Edelman	kym.edelman@shawgrp.com (757) 640.6950 (o) (757) 435.5384 (c) Shaw Environmental, Inc. 500 E. Main Street, Suite 1630 Norfolk, VA 23510

2.2 PERSONNEL DUTIES AND RESPONSIBILITIES

The Shaw Project Manager (PM) will ensure compliance with the Statement of Work (SOW) and is the Team point of contact (POC) with the Navy. The PM is responsible for managing the day-to-day project activities, ensuring documentation and deliverables meet contract requirements, monitoring costs and accounting, and controlling the overall schedule.

During all site work activities, Shaw will provide a Site Superintendent. The Site Superintendent will be responsible for daily oversight of field activities, interface with Base personnel, and applying for necessary permits. The Site Superintendent will also be responsible for health and safety and QA/QC. A

Shaw Site Safety Officer (SSO) will be available to assist the Site Supervisor with implementation of the project specific H&S Plan included as **Appendix C**. Additionally, Shaw will provide a Site QC Manager to aid in implementation of the QC Plan included as **Appendix D**.

The Project Engineer reports directly to the PM, and is responsible for technical issues and guidance. The Project Engineer will work closely with the Site Superintendent and subcontractor personnel to execute the project according to the SOW, approved design, and approved Work Plan.

Supporting the PM with contractual and budget issues are the Shaw Contract Manager and Cost and Schedule Manager. The Shaw Contract Manager is the POC with the Navy Contracting Officer, ensuring compliance with the prime contract requirements. The Cost and Schedule Manager is responsible for accumulating project costs expended to date, forecasting costs to completion, preparing monthly invoices, and maintaining and updating the project schedule.

2.3 MEETINGS AND REPORTS

Progress meetings will be held with Navy personnel on a regular basis to discuss progress and any issues. Also, the required QC meetings will be conducted on site for each phase of work as discussed further in the QC Plan (**Appendix D**). Minutes of all meetings will be kept by the Shaw QC Manager and submitted to the Navy.

A daily Contractor Production Report (CPR) and QC Report will be completed whenever site activities occur and will be submitted as required. Monthly Progress Reports (MPRs) will be completed monthly and submitted per contract requirements. At the conclusion of all required field activities, a Completion Report detailing all project activities will be prepared and submitted to the Navy and all required stakeholders.

3.0 PROJECT ACTIVITIES

The removal action at SWMU-14 of the Naval Station Norfolk is being conducted to mitigate potential human health risks presented by contamination in the soil from past operations. This action will involve placing an asphalt cover over the entire area of the site which will serve as a much needed parking lot for NSN and prevent exposure to future receptors.

3.1 PRE-CONSTRUCTION ACTIVITIES

Pre-Construction activities consist of developing required plans, initiating procurements, obtaining security clearances for site personnel, attending a pre-construction meeting, and conducting waste disposal characterization sampling as appropriate.

3.1.1 Plans and Procurement

All plans will be submitted for approval prior to commencing construction field work including the Work Plan, figures and construction drawings, the Environmental Protection Plan, the Erosion & Sediment Control Plan, the Field Sampling & Analysis Plan, the Site Specific Health and Safety Plan, and the Quality Control Plan. Additionally, actions will be initiated to procure services, materials, and equipment necessary to conduct site activities.

3.1.2 Base Access / Security Requirements

Prior to mobilization of Shaw and subcontractor personnel, required personal information will be submitted to Base security 1-2 weeks in advance of the planned day for mobilization. Once background checks have cleared, personnel will proceed to the Base Pass Office to obtain personnel and vehicle passes as necessary.

Any vendors delivering or picking up materials and/or equipment will be required to go through the truck inspection station adjacent to the Base Pass Office on Hampton Blvd. Once cleared and given a temporary vehicle pass, vendors will proceed to the site through Gate 5 and follow the approved haul route shown in **Figure 3.**

3.1.3 Pre-Construction Meeting

Shaw will attend a pre-construction meeting conducted by the Navy Public Works Department (PWD) Facilities Engineering & Acquisition Department (FEAD) Representative which will be attended by all project pertinent parties. Discussion topics at the meeting may include:

- Overall approach to remedial activity
- Client expectations
- Access/security/badge requirements
- Schedule and specific tasks included
- Work shifts and weekend work
- Reporting requirements for field reports to FEAD
- Submittal and approval of plans, drawings, etc.
- Utility clearance
- Site layout and logistics
- Roles and responsibilities of all stakeholders

3.1.4 Waste Disposal Characterization Sampling & Analysis

Shaw will collect samples of known waste materials for waste disposal characterization. The samples will be sent to an approved off-site laboratory for analysis. This will enable Shaw to expedite classification of the waste and disposal facility approval in an effort to alleviate any delays once construction activities are in progress. Waste materials anticipated to be encountered may include the vegetative layer and other waste generated during site activities such as decontamination water and spent personal protective equipment (PPE). The analytical results and selected disposal facility will be submitted for approval prior to disposal of any waste materials. Any other waste materials encountered will be segregated, containerized, and characterized for proper disposal. For the purposes of this project, all material is anticipated to be non-hazardous. However, if waste characterization indicates otherwise, appropriate actions will be taken to properly dispose as hazardous waste. Please refer to **Appendix F**, Field Sampling and Analysis Plan, for further details.

3.2 MOBILIZATION AND SITE PREPARATION

Mobilization and site preparation will occur following notice to proceed from the FEAD. Upon mobilization, Shaw will: receive temporary facilities, equipment, and materials; locate subsurface utilities and obtain a dig permit; establish a support and lay-down area; set up site controls and signage; install temporary construction entrance (see project specifications); and install erosion and sediment controls.

3.2.1 Mobilization

Shaw will mobilize all personnel, equipment, temporary facilities, and materials necessary to safely and efficiently complete the required project tasks. Upon receipt, the condition of all equipment, facilities, and materials will be inspected and documented by the site QC Manager. Rental equipment and temporary facilities will be mobilized from local vendors. Temporary facilities will include an office trailer, generator, dumpster, tool storage trailer, diesel fuel tank, and port-a-johns. These facilities will be staged at approved locations as shown in **Appendix B.**

3.2.2 Utility Clearance

Shaw will contract a private utility locator to perform a subsurface electromagnetic scan of the site to identify and mark underground utilities. Additionally, Shaw will notify Miss Utility at least 48 hours prior to any intrusive activities and will update the dig permit ticket as required.

3.2.3 Site Set-Up

In preparation for conducting project activities, Shaw will stage and set temporary facilities and materials in the approved support and lay-down areas. Temporary facilities will be anchored and/or tied down appropriately and proper signage attached. Materials will be properly stored and covered as appropriate.

Delineation of work zones will be established utilizing high-visibility or temporary chain-link fencing as necessary. Appropriate signage will be posted to clearly identify work zones, potential safety hazards, and requirements for access such as training or personal protective equipment. This will be discussed further in the SSHSP (**Appendix C**).

In addition, Shaw will install access roads as appropriate within the limits of the site to enable vehicular access and construction equipment to move throughout the area.

3.2.4 Installation of Erosion & Sediment Controls

Prior to commencing any construction activities, Shaw will install Phase-I erosion and sediment (E&S) controls throughout the site per Construction Drawing C-2 provided in **Appendix B.** Controls such as construction entrances, decontamination pads, silt fencing, bio-socks/tubes, sediment traps, diversion dikes, and poly-sheeting to cover material stockpiles will be implemented and maintained as necessary throughout the life of the project to prevent and/or minimize erosion and migration of sediment. As construction activities progress, Phase-II controls will be implemented as appropriate per Construction Drawing C-3 also provided in **Appendix B**. Features may include storm drain inlet and outlet protection and conversion of temporary controls to permanent controls (i.e. sediment traps to bio-retention areas).

Heavy equipment (i.e. appropriately sized bull dozer, excavator, and front end loader) will be utilized to install these drainage features as necessary. Excavated and graded site soils will be reused on-site as much as possible. Any debris encountered will be segregated, staged in a roll-off box, and characterized for proper disposal. Dust control measures will be implemented as needed during all ground disturbance activities.

3.3 SITE REMOVAL AND GRADING ACTIVITIES

The following sub-sections describe in detail the removal and grading activities for SWMU-14.

3.3.1 Concrete Pad Removal

Based upon the Final Design Drawings dated May 2008, and incorporated in this workplan as Construction Drawings in Appendix B, the existing concrete pad will remain in-place and will be paved over as part of the asphalt parking area.

3.3.2 Removal of Transformer and Concrete Pad

The existing transformer and concrete pad will be protected during construction and will remain as shown on the Final Design Drawings dated May 2008.

3.3.3 Monitoring Well Abandonment / Modification

The existing monitoring wells that are within the area of the asphalt cover / parking lot will be protected and adjusted to the final grade of the asphalt cover as shown on the Final Design Drawings. This adjustment will be performed in accordance with the Virginia Department of Environmental Quality (VADEQ) regulations as required. This modification will include installing appropriate traffic rated well covers. All modified well elevations will be included in the final as-built survey.

3.3.4 Initial Grading Activities

Following installation of the necessary Phase-I E&S controls, initial grading activities will commence in a phased approach. Removal of the surface vegetative layer will be conducted initially. Next, a field survey will be completed to identify desired grades per the approved design throughout the site. Grade stakes will be placed as appropriate to indicate the final grades. A bull dozer will be utilized to initially cut a rough grade of the area followed by fine grading of that area. In areas that may require deep cuts to obtain grade, an excavator may be used to support grading activities. The project engineer will check grades which will be verified by the Site QC Manager. A smooth drummed vibratory roller will be utilized as necessary to obtain specified compaction requirements. Testing of the materials used and areas graded will be performed by a qualified subcontractor as required by the project specifications and Quality Control Plan (**Appendix D**).

As existing soils are graded and moved throughout the site, E&S controls and temporary drainage features will be maintained and added as necessary throughout the site. Dust suppression measures, such as use of a water truck, will be utilized as needed pending the results of site air monitoring activities conducted by the SSO.

In the event isolated landfill debris is uncovered during initial grading activities, it will be segregated, contained (i.e. drummed or placed in a roll-off) and characterized for proper off-site disposal. If large volumes of debris are uncovered, the debris will be over-excavated by a 2 foot depth and back filled with approved clean fill material (**Appendix F**). The large volume of debris will either be:

- Left in place with appropriate controls until the characterization and approval process for waste disposal is complete. Then, it will be direct loaded into haul trucks for off-site disposal.
- Immediately loaded into roll-off boxes and stored on site until the characterization and approval process is complete. Then, the roll-off boxes will be shipped off-site for disposal.

The Navy FEAD will be notified immediately upon uncovering any significant volumes of trash or debris.

3.3.5 Installation Of Permanent Drainage Control Features

As site grading activities progress, temporary drainage controls will gradually be replaced by permanent controls as appropriate. Permanent features will include: bioretention areas, sub-surface drainage piping and manholes, and storm drain inlet and outlet protection.

Subsurface drainage piping and associated drain basins will be installed as shown in the Construction Drawings included as **Appendix B.** An excavator will be used to dig the trenches and basin areas needed for placement of piping and pre-fabricated drain basins. Sections of trench will be opened and bedding material will be placed at the bottom of the trench. After placing bedding material and compacting, the piping will be installed to the grades and slopes indicated in **Appendix B.** For the excavated basin areas, an impermeable liner will be placed at the bottom, perforated HDPE piping and catch basins will be installed, and the basin will then be backfilled with gravel to the specified elevation and covered with filter fabric creating a temporary sediment trap that will remain in place until completion of the aggregate base course preparation. The project engineer and/or the QC Manager will verify piping and drop inlet elevations to ensure positive drainage of the system. During excavation activities, required air monitoring will be conducted and dust control measures will be implemented as needed. Please refer back to Section 3.3.4 for the planned course of action in the event trash and/or debris is encountered.

Storm drain inlet and outlet protection will be installed as necessary per the E&S Control Plan (**Appendix**

G) and the approved Construction Drawings in **Appendix B**. Rip-rap and other materials will be imported as needed to construct these features.

After completion of the aggregate base course preparation, the sediment traps will be converted into bioretention basins. This will be achieved by removing any accumulated sediment from the filter fabric and filling each basin with an engineered soil mix. The soil mix will be in accordance with the project specifications and will consist of 20% topsoil, 30% fully composted leaves, and 50% sand.

3.3.6 Installation Of Underground Conduit and Light Pole Concrete Foundations

Concurrent with the installation of the stormwater drainage system, the lighting system conduit and concrete foundations for the light poles will be installed by Shaw per the attached Construction Drawings in **Appendix B**.

Trenching will be conducted to provide direct burial installation of the appropriately sized conduit at a minimum of 15 inches below top of sub-grade (24 inches below final grade) as detailed in the project specifications. Magnetic marking tape will be placed above the conduit at 6 inches beneath the sub-grade elevation. The conduit will be stubbed up at the appropriate locations per design and with pull strings to enable future wiring installation.

Shaw will excavate as necessary in preparation for placement of the light pole concrete foundations. The foundation locations will be appropriately prepared and formed for concrete placement. Concrete will be placed for each foundation and the light pole anchor bolts will be set in place upon placement of the concrete. The concrete shall be tested by an approved 3rd party testing service to ensure that it meets the approved specifications.

3.3.7 Installation Of Base Materials

Initially, the natural grade (prepared subgrade) will be formed using existing site materials. If there is not enough material onsite to form the prepared subgrade, approved clean fill will be imported as necessary prior to placing the aggregate base course as shown on Construction Drawing SD-1 provided in **Appendix B**. Upon confirmation that the natural grade has been completed in accordance with the design specifications, installation of the aggregate base course will begin.

Haul trucks delivering the materials to the site will follow the approved haul routes on and off the site as shown in **Figure 3**. A spotter will be used to direct the truck to the correct area for dumping materials and will collect the bill of lading from each driver. The Site QC Manager will verify that the materials meet design specifications. Upon leaving the site, the haul truck will be visually inspected and any loose

dirt or debris on the truck will be removed (**Appendix E**). Haul trucks will leave the site from the approved construction entrance.

An appropriately sized bull dozer will be utilized to place the prepared subgrade and aggregate base course in lifts as necessary. In addition, a front-end loader may be used to assist the bull-dozer via shuttling materials to desired locations. The material will be graded to meet the desired elevations as indicated by grade stakes placed by the project engineer as appropriate. A smooth-drum vibratory roller will be utilized to compact each lift as it is placed and graded. Testing of imported materials and prepared areas will be performed by a qualified subcontractor as required by the project specifications and Quality Control Plan (**Appendix D**). Dust control measures will be implemented as necessary during placement and compaction of all materials.

3.3.8 Asphalt Cover Placement

Shaw will contract the services of an asphalt paving company to place the asphalt cover (asphalt base course and asphalt surface course) for the parking lot as depicted on Construction Drawing C-5 in **Appendix B**. This will include 2-inches of asphalt surface course for light traffic areas and 2-inches of asphalt base course plus 1.5-inches of surface course for heavy traffic areas. Following placement and grading of all base materials to the required elevations, removal of the appropriate temporary controls, installation of permanent drainage control features, and installation of conduit and foundations for electrical wiring, Shaw will mobilize the asphalt paving contractor to place the asphalt pavement for the parking lot. All features of the parking lot pavement including entrances, exits, roadways, curbing, and parking areas will be installed by this contractor. The Shaw QC Manager, Site Safety Officer, Site Superintendent, and Project Engineer will provide direct oversight to ensure that these activities are done safely and meet the design requirements. Testing of paving materials to be used and prepared areas will be performed by a qualified subcontractor as required by the project specifications and Quality Control Plan (**Appendix D**).

3.3.9 Installation of Parking Lot Lighting

All wiring, poles, and fixtures will be installed and mounted by an electrical subcontractor per Construction Drawings E-1 and E-2 provided in **Appendix B**. All electrical wiring will be pulled through the installed conduits and properly terminated at each light pole and the power source tie-in location as required. Poles and fixtures will be installed on each foundation and properly fastened. All electrical installations will be performed by a licensed electrician and all will be in accordance with the approved project specifications, drawings, and applicable NFPA and IEEE standards.

3.3.10 Transportation and Disposal

For this project, it is anticipated that any waste materials encountered will be suitable for non-hazardous transportation and disposal to an approved RCRA Subtitle D landfill facility. However, all waste materials will be appropriately sampled and characterized for proper disposal.

Site waste materials requiring transportation off site to an approved disposal facility may include the following:

- Vegetative layer removed
- Decontamination water
- Spent PPE
- Landfill debris (inadvertently uncovered during site activities)

Waste landfill debris will be removed and either direct loaded into haul trucks or roll-off boxes as appropriate utilizing an excavator or front-end loader. Decontamination water and spent PPE will be properly stored, characterized for disposal, and picked up for transportation and disposal to an approved off-site facility.

All trucks transporting waste off-site will be visually inspected prior to exiting the site to ensure that the truck exterior is clean, the tailgate is properly secured, the load is covered with a tarp, the tires are not excessively worn and properly inflated, no liquids are leaking from the truck, all licenses and registrations are current, and the truck driver has the proper shipping documents. Following exiting the site, the truck will proceed to a nearby weigh station. If determined overweight by the scale, the truck will immediately return to the site to have some material removed. See **Appendix E** for further details.

In addition to truck inspections, a waste tracking log will be maintained on-site by the QC Manager. This log will document the details of all waste materials shipped off-site. The waste tracking log, manifests, truck inspections, and certificates of disposal will all be included in the project Completion Report.

3.4 SITE RESTORATION

This section discusses the site restoration activities that will be conducted to include: Landscaping and vegetation repair; parking lot striping; removal of temporary E&S controls; and completion of the final as-built survey.

3.4.1 Landscaping and Vegetation Repair

Disturbed areas of the site will be restored as appropriate at the completion of construction activities. This may include seeding, placement of stone, paving repairs, or other means as appropriate. Areas that

may be impacted include the support area, lay-down area, and Base roadways adjacent to the site.

Landscaping activities will be completed for the bioretention basins as required. This may include placement of mulch and planting of grass, shrubbery, and trees. This will be done in accordance with the project design and specifications. If possible, planting activities will occur in the fall (October) planting season to improve survivability and successful establishment of all newly planted vegetation.

3.4.2 Parking Lot Striping

Following the placement and curing of the asphalt cover, Shaw will contract a qualified pavement striping contractor to paint lines as required to identify all parking spaces, entrances, exits, throughways, and traffic patterns in accordance with the design, project specifications, and Base requirements. Wheel stops will also be installed at this time. The asphalt striping plan is shown on Construction Drawing C-5 in **Appendix B**.

3.4.3 Removal Of Temporary E&S Controls

Following installation of permanent drainage controls and the parking lot, temporary E&S controls will be removed and discarded as appropriate. Controls for disturbed areas that have not been stabilized will be left in place and maintained until the area has been satisfactorily stabilized and/or grass is fully established. In addition, drainage inlet and outlet protection measures will remain in place for an extended period of time following construction activities.

3.4.4 Final As-Built Survey

Following the installation of the parking lot and all associated features, Shaw will mobilize a surveyor licensed in the state of Virginia to conduct a survey of all final conditions. A final topographic survey will be performed to indicate the elevations and locations of all parking lot features, the associated drainage features, and any modified monitoring wells. A final as-built drawing will be included as a hard copy and on CD in the Completion Report.

3.5 SITE TEARDOWN AND DEMOBILIZATION

This section will discuss the removal of all site personnel, equipment, temporary facilities, and excess materials.

During the life of the project, equipment and personnel will be demobilized as project activities dictate. Prior to equipment leaving the site, it will be properly decontaminated and thoroughly cleaned on the temporary decontamination pad. At the conclusion of the project, all equipment, materials and temporary facilities will be removed from the site. The exiting condition of all equipment and temporary facilities will be documented.

The disposition of materials that are government property will be determined by the FEAD representative. If remaining on-site, they will be properly stored to minimize adverse effect to the material or surrounding environment.

3.6 COMPLETION REPORT

Following the successful completion of all field activities, conducting a final walk-through inspection with the FEAD and NTR, and receiving government acceptance, a Completion Report will be prepared and submitted to all pertinent parties. This section provides details of the Completion Report.

A Draft Completion Report will be prepared and submitted within 4 weeks following completion of all field activities. Following government review of the report, all comments will be addressed and the Final Completion Report will be submitted as required to all pertinent parties.

The Completion Report will include, at a minimum, the following:

- Details of all completed tasks
- Final as-built survey
- Photographic documentation
- Waste disposal records (waste tracking log, manifests, truck inspections and certificates of disposal)
- QC testing and inspection results
- Product specifications/cut sheets
- Health and safety documentation (i.e. air monitoring logs)
- Sample log
- Daily contractor production reports and QC reports
- Progress meeting minutes

FIGURES

OFFICE	DRAWING NUMBER
Norfolk, VA	BT-129893-A1

DESCRIPTION/ISSUE
REVISIONS

Shaw® Shaw Environmental, Inc.

DESIGNED BY	AF	12/07	12/07
DRAWN BY	MLP	12/07	-
CHECKED BY	AF	-	
APPROVED BY	-		

NAVAL STATION NORFOLK

NORFOLK, VA

SWMU 14 ASPHALT COVER - REMOVAL ACTION

INSTALLATION LOCATION MAP

SCALE: AS SHOWN

SIZE: A

TASK ORDER NO. —

CONSTR. CONTRACT NO. —

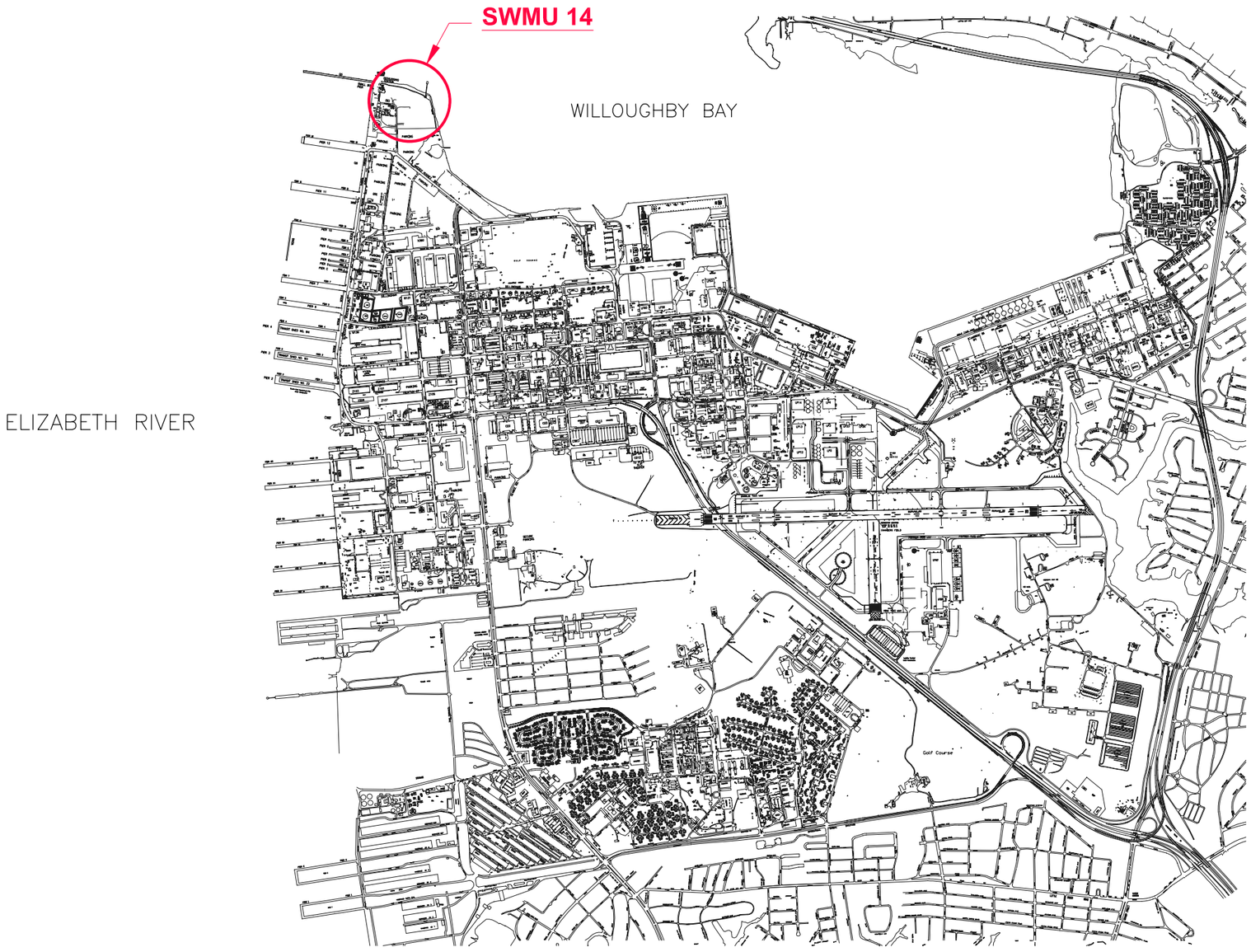
NAVFAC DRAWING NO. 129893

SHEET I.D.

FIGURE 1

XREF Files: IMAGE Files: NAS SITE.jpg
File: N:\Project\final\CADD-2007Shaw Offices\CAD-Norfolk VA\Norfolk Naval Base\SWMU 14\BT-129893-A1.dwg Layout: Layout1 User: maria.portacio Dec 18, 2007 - 12:18pm

OFFICE	DRAWING NUMBER
Norfolk, VA	BT-129893-B1



0 1/2 1

APPROXIMATE SCALE IN MILES

N

REVISIONS

Shaw® Shaw Environmental, Inc.

DESIGNED BY	AF	12/07	CHECKED BY	AF	12/07
DRAWN BY	MLP	12/07	APPROVED BY	–	–

NAVAL STATION NORFOLK

NORFOLK, VA

SWMU 14 ASPHALT COVER – REMOVAL ACTION

SITE LOCATION MAP

SCALE:

SIZE: B

TASK ORDER NO. —

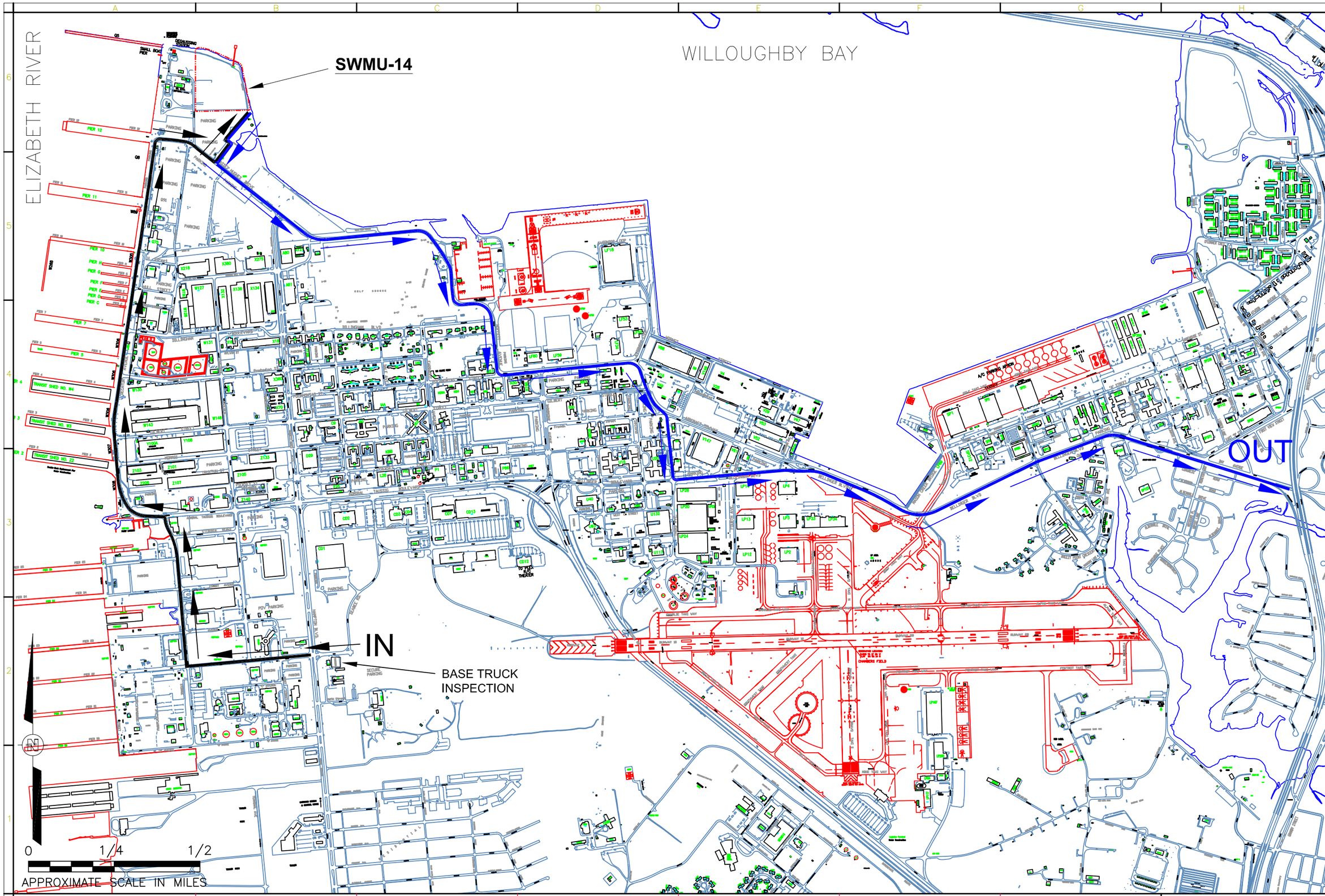
CONSTR. CONTRACT NO.

NAVFAC DRAWING NO. 129893

SHEET I.D.

FIGURE 2

XREF Files: FDMISC IMAGE Files:
File: N:\Project\Final\CADD-2007Shaw Offices\CAD-Norfolk VA\Norfolk Naval Base\SWMU 14\BT-129893-B1.dwg Layout: FIG1 User: mario.portacio Dec 18, 2007 – 12:29pm



REVISION SCHEDULE

Rev #	Description	Date
—	—	—

Designed by: B. Mourdin
Dwn by: TFR
Reviewed by: M. Pisarck
Submitted by: B. Mourdin
Date: 03/05/08
Shaw Project No. 129893
Contr No. —

SHAW ENVIRONMENTAL, INC.
500 E. Main Street
Norfolk, VA

SWMU-14
NAVAL STATION NORFOLK
NORFOLK, VIRGINIA
PROPOSED HAUL ROUTE

Figure No: 3

Sheet No: 1 of 1

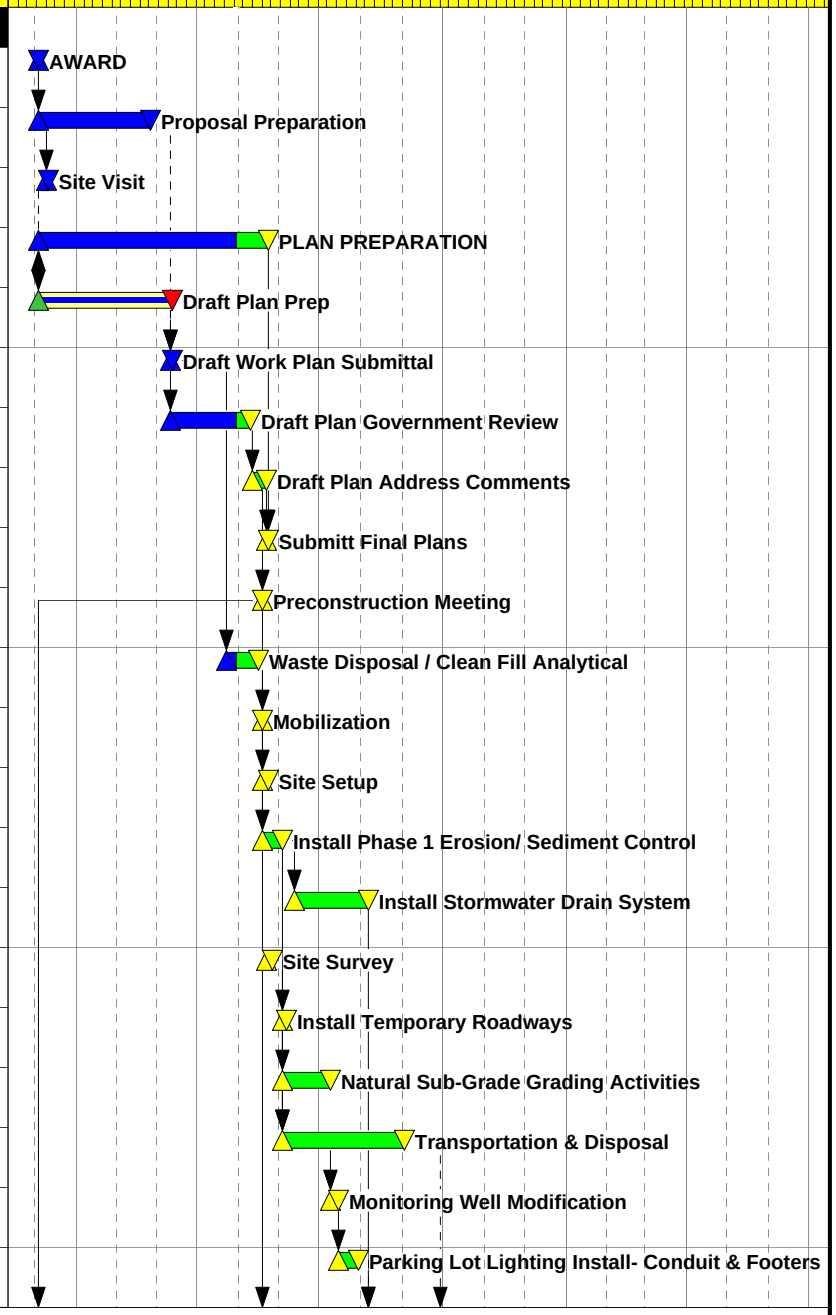
DESIGN FILE:

Appendix A

Project Schedule

RAC IV TO-120 Q-Area Removal Action

Activity ID	WBS	Activity Description	Orig Dur	%	Early Start	Early Finish
0100		AWARD	1	100	04DEC07A	04DEC07A
0102	01003010	Proposal Preparation	60	100	04DEC07A	25FEB08A
0104	01000010	Site Visit	1	100	11DEC07A	11DEC07A
0105	01009100	PLAN PREPARATION	124*	85	04DEC07A	23MAY08
0110		Draft Plan Prep	70	100	04DEC07A	12MAR08A
0120		Draft Work Plan Submittal	1	100	12MAR08A	12MAR08A
0130		Draft Plan Government Review	30	0	12MAR08A	09MAY08
0132		Draft Plan Address Comments	9	0	12MAY08	22MAY08
0134		Submitt Final Plans	1	0	23MAY08	23MAY08
0140	01003000	Preconstruction Meeting	1	0	19MAY08	19MAY08
0150	03004000	Waste Disposal / Clean Fill Analytical	19	0	22APR08A	16MAY08
0160	02001000	Mobilization	1	0	19MAY08	19MAY08
0165	02002000	Site Setup	4	0	20MAY08	23MAY08
0167	06001000	Install Phase 1 Erosion/ Sediment Control	10	0	20MAY08	02JUN08
0171	10001000	Install Stormwater Drain System	40	0	12JUN08	06AUG08
0172	03005000	Site Survey	3	0	22MAY08	26MAY08
0173	05001000	Install Temporary Roadways	3	0	04JUN08	06JUN08
0174	09001000	Natural Sub-Grade Grading Activities	25	0	04JUN08	08JUL08
0175	03003000	Transportation & Disposal	65	0	04JUN08	02SEP08
0178	08001000	Monitoring Well Modification	5	0	09JUL08	15JUL08
0188	19001000	Parking Lot Lighting Install- Conduit & Footers	10	0	16JUL08	29JUL08



Start Date	12NOV07
Finish Date	28NOV08
Run Date	13MAY08 15:38

120I

Sheet 1 of 2

RAC IV TO-120 Q-Area Removal Action
Norfolk Naval Base
Norfolk, VA
As of April 30, 2008

Shaw Environmental, Inc

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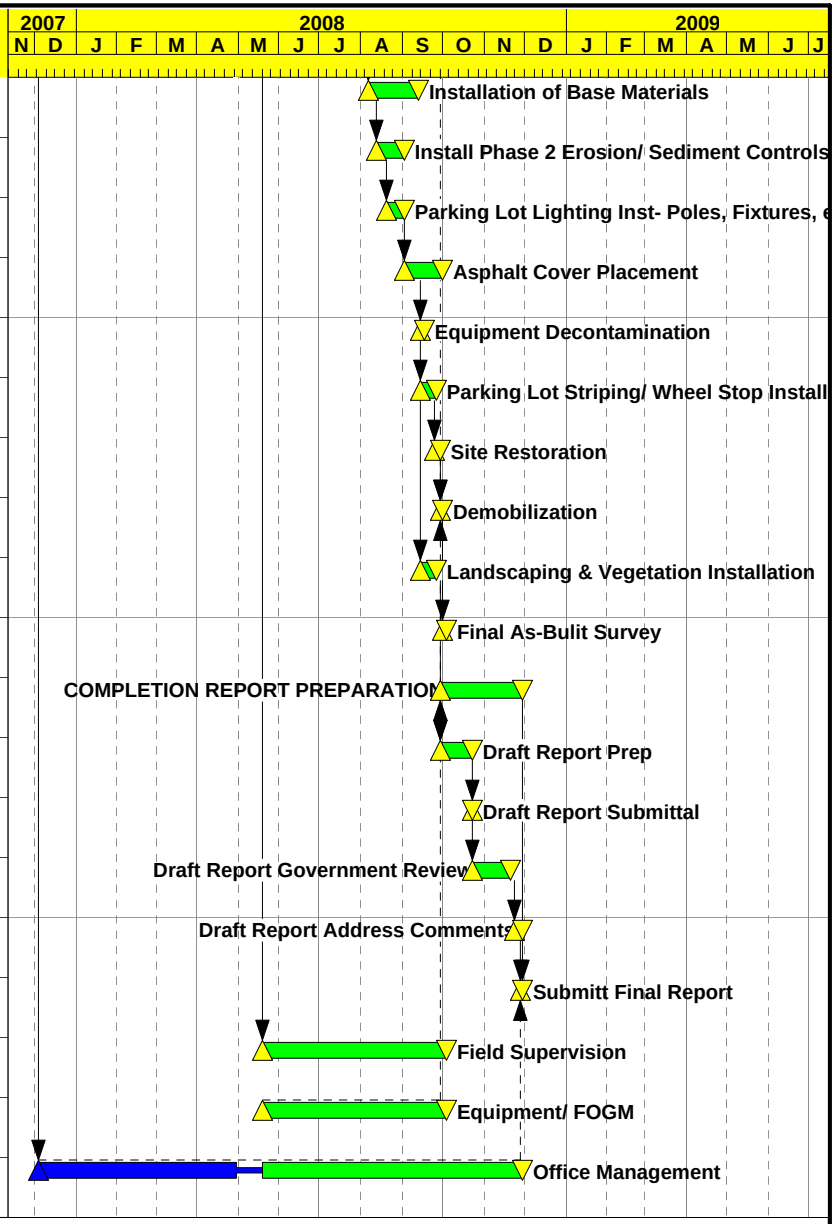
Activity ID	WBS	Activity Description	Orig Dur	%	Early Start	Early Finish
0195	12001000	Installation of Base Materials	27	0	07AUG08	12SEP08
0420	11001000	Install Phase 2 Erosion/ Sediment Controls	15	0	13AUG08	02SEP08
0425	19001000	Parking Lot Lighting Inst- Poles, Fixtures, etc	10	0	20AUG08	02SEP08
0430	14001000	Asphalt Cover Placement	20	0	03SEP08	30SEP08
0440	13001000	Equipment Decontamination	3	0	15SEP08	17SEP08
0450	16001000	Parking Lot Striping/ Wheel Stop Install	10	0	15SEP08	26SEP08
0455	17001000	Site Restoration	3	0	25SEP08	29SEP08
0457	17001500	Demobilization	1	0	30SEP08	30SEP08
0460	15001000	Landscaping & Vegetation Installation	10	0	15SEP08	26SEP08
0490	18001000	Final As-Bulit Survey	3	0	01OCT08	03OCT08
0500	21001000	COMPLETION REPORT PREPARATION	45*	0	29SEP08	28NOV08
0600		Draft Report Prep	18	0	29SEP08	22OCT08
0700		Draft Report Submittal	1	0	23OCT08	23OCT08
0800		Draft Report Government Review	20	0	24OCT08	20NOV08
0900		Draft Report Address Comments	5	0	24NOV08	28NOV08
1000		Submitt Final Report	1	0	28NOV08	28NOV08
1100	99001000	Field Supervision	100	0	19MAY08	03OCT08
1120	99092000	Equipment/ FOGM	100	0	19MAY08	03OCT08
1200	99003000	Office Management	162	5	05DEC07A	28NOV08



Start Date 12NOV07
Finish Date 28NOV08
Run Date 13MAY08 15:38

120I

Sheet 2 of 2

RAC IV TO-120 Q-Area Removal Action
Norfolk Naval Base
Norfolk, VA
As of April 30, 2008

Shaw Environmental, Inc

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Appendix B

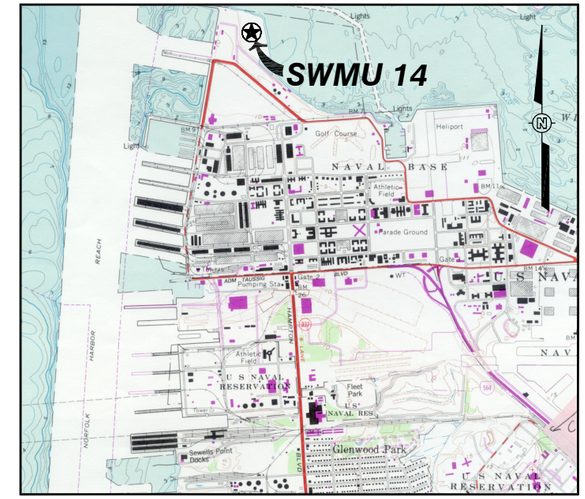
Construction Drawings

REFERENCE:

MAP TAKEN FROM AMERICAN MAP CORPORATION UNITED STATES ROAD ATLAS STATE OF VIRGINIA, DATED: 1997.

SITE VICINITY MAP

SCALE
0 28 56 MILES



REFERENCE:

TOPOGRAPHIC MAP TAKEN FROM U.S.G.S. 7.5 MINUTE NORFOLK NORTH QUADRANGLE, DATED: 1965, PHOTO INSPECTED: 1989, SCALE:1"=2000'.

SITE LOCATION MAP

SCALE
0 2000 4000 FEET

SWMU-14
ASPHALT COVER - REMOVAL ACTION

NAVAL STATION NORFOLK
NORFOLK, VIRGINIA

PREPARED FOR

DEPARTMENT OF THE NAVY
MID-ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw Environmental, Inc.

DESIGNED BY: L. McTall	DEPARTMENT OF THE NAVY MID-ATLANTIC DIVISION			
DRAWN BY: G. Jones	TITLE SHEET			
CHECKED BY: E. Duke	NAVAL STATION NORFOLK NORFOLK, VIRGINIA			
APPROVED BY: M. Pisarcik	DATE: 5/23/08	SCALE: AS SHOWN	DRAWING NO. 129893–T1	SHEET NO. T-1

OFFICE Pittsburgh, PA
DRAWING NUMBER 129893-T1

VERIFY SCALE 0 1"

Xref : Image : street.jpg usgs.jpg

File: O:\Project\129893\129893T1_REV_3_11_08.dwg
Plot Date/Time: May 23, 2008 – 10:11am
Plotted By: arthur.smith

INDEX OF DRAWINGS

NAVFAC DRAWING NO.	DRAWING NUMBER	DESCRIPTION
12,000,200	G-0	COVER SHEET AND SITE LOCATION
12,000,201	G-1	DRAWING INDEX
12,000,202	G-2	CIVIL LEGEND, NOTES, AND ABBREVIATIONS
12,000,203	C-1	EXISTING SITE CONDITIONS AND DEMO PLAN
	C-1A	SITE LAYOUT (SHAW DRAWING ADDED TO SET)
12,000,204	C-2	EROSION AND SEDIMENT CONTROL PHASE 1
12,000,205	C-3	EROSION AND SEDIMENT CONTROL PHASE 2
12,000,206	C-4	GRADING PLAN
12,000,207	C-5	ASPHALT PLAN
12,000,208	C-6	STORM PROFILES
12,000,209	C-7	STORM PROFILES
12,000,210	C-8	PARKING PROFILES
12,000,211	C-9	SITE PLAN
12,000,212	D-1	BIORETENTION DETAILS
12,000,213	D-2	BIORETENTION DETAILS
12,000,214	D-3	BIORETENTION DETAILS AND PLANTING SCHEDULE
12,000,215	SD-1	STANDARD AND PAVING DETAILS
12,000,216	E-1	SITE LIGHTING – OVERALL PLAN
12,000,217	E-2	ELECTRICAL LEGEND AND DETAILS

GENERAL SITE NOTES:

1. SOURCE OF TOPOGRAPHY SHOWN ON THE CIVIL PLANS ARE FIELD SURVEY DATED OCTOBER 12, 2007 BY THE SPECTRA GROUP. VERTICAL AND HORIZONTAL DATUMS USED FOR THE SURVEY ARE FROM CITY OF NORFOLK PUBLISHED CONTROL. BENCH MARK GPS045, ELEV. 9.66 NAVD88(92) THE SURVEY DOES NOT GUARANTEE THE EXISTENCE OR NON-EXISTENCE OF UNDERGROUND UTILITIES. PRIOR TO ANY CONSTRUCTION OR EXCAVATION THE CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OF, OR THE NON-EXISTENCE OF UNDERGROUND UTILITIES BY CONTACTING "MISS UTILITIES" BY DIALING "811"
2. EXISTING TOPOGRAPHY, STRUCTURES, AND SITE FEATURES ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW FINISH GRADE, STRUCTURES, AND SITE FEATURES ARE SHOWN HEAVY-LINED.
3. MAINTAIN, RELOCATE, OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS, AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM THE WORK TO PRODUCE THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENT(S) IN A TIMELY MANNER, AND AT THE CONTRACTOR'S EXPENSE.
4. ALL STATIONING AND DISTANCES SHOWN ON THE DRAWINGS ARE BASED ON HORIZONTAL MEASUREMENTS.
5. UTILITY LINES SHOWN ON THE DRAWING WERE TAKEN FROM AVAILABLE UTILITY DRAWINGS AND FROM THE SITE SURVEY. CONTRACTOR SHALL CONFIRM UTILITY LOCATIONS BEFORE STARTING EXCAVATION ACTIVITIES. ELEVATIONS GIVEN ARE TO FINISH GRADE UNLESS OTHERWISE SHOWN.
6. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
7. IN GENERAL, THE ENTIRE SITE IS TO BE PAVED EXCEPT FOR THE AREAS AROUND THE BIORETENTION FACILITIES. SEE SHEET C-4, C-6 AND C-7.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION.
9. CONTRACTOR SHALL TAKE ALL OTHER MEASURES TO PREVENT SEDIMENT FROM LEAVING THE SITE.
10. THIS WORK IS BEING PERFORMED UNDER THE NAVY'S INSTALLATION RESTORATION PROGRAM AND, THEREFORE, NO PERMITS ARE REQUIRED. HOWEVER, THE SUBSTANTIVE REQUIREMENTS OF APPLICABLE PERMITS SHALL BE MET.
11. SWMU 14 IS AN ENVIRONMENTAL RESTORATION SITE WITHIN THE NAVY'S INSTALLATION RESTORATION PROGRAM. SOILS EXCAVATED FOR THE PURPOSE OF SITE GRADING, CONSTRUCTION OF BIORETENTION AREAS, AND PIPING/CONDUIT TRENCHES MAY BE USED AS GENERAL FILL WITHIN THE SITE BOUNDARY PROVIDED IT IS COVERED BY ASPHALT AT THE COMPLETION OF CONSTRUCTION. CONSTRUCTION DEBRIS MATERIALS SHALL BE SEGREGATED, CONSOLIDATED, AND DISPOSED OF OFF-SITE IN ACCORDANCE WITH APPLICABLE REGULATIONS. ANY MATERIALS UNCOVERED THAT APPEAR TO BE POTENTIALLY HAZARDOUS REQUIRE IMMEDIATE NOTIFICATION OF THE NAVY TO DETERMINE APPROPRIATE HANDLING AND DISPOSAL.
12. GROUNDWATER MONITORING WELLS SHALL BE PROTECTED DURING CONSTRUCTION AND EXTENDED FOR FLUSH MOUNT CONSTRUCTION WITH THE FINISHED GRADE.
13. CONTRACTOR SHALL GIVE RIOCC OFFICE MINIMUM OF 14 DAYS NOTICE PRIOR TO STARTING CONSTRUCTION.

SYM	DESCRIPTION	DATE	APPR
1	ADDED C-10 TO DRAWING LIST	5/23/08	ED

NAVFAC

COMMONWEALTH OF VIRGINIA
HOWARD LUSK
Lic No. 034029
PROFESSIONAL ENGINEER

APPROVED
FOR COMMANDER NAVFAC DATE
APPROVED
XXX
ACTIVITY – SATISFACTORY TO DATE –
PM/DM
DES: K.HAN | DRW: K.HAN | CHK: H.LUSK
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK
NAVAL FACILITIES ENGINEERING COMMAND ~
NAVAL STATION – NORFOLK, VIRGINIA
NAVAL STATION
NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
DRAWING INDEX

CODE ID. NO. 80091 | SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO.
N62470-03-D-3052-0173
NAVFAC DRAWING NO.
12,000,201
SHEET 2 OF 18
G-1

DRAWFORM REVISION: 6 AUG 2007

FILE NAME: S:\CAD_Virginia\129893_NWS NORFOLK\dn01g001_358444-Shaw-r1.dwg LAYOUT NAME: Model PLOTTED: Friday, May 23, 2008 - 3:05pm USER: steve.zimmerman

STORMWATER NARRATIVE:

THE PROJECT CONSISTS OF CONSTRUCTION OF A LARGE PARKING LOT WITH THIRTEEN BIORETENTION FACILITIES.

THE BIORETENTION FACILITIES WILL COLLECT STORMWATER RUNOFF AS SHEET FLOW FROM THE PARKING LOT CONSTRUCTED WITH THIS PROJECT. BIORETENTION FACILITIES 1& 2 WILL DRAIN THROUGH FILTER FABRIC INTO WILLOWBY BAY. BIORETENTION FACILITY #10&11 HAS AN UNDERDRAIN CONNECTED TO THE REAR OF THE EXISTING REVETMENT. THE FILTERED WATER AND OVERFLOW FROM LARGE STORMS FOR BIORETENTION FACILITIES #3–#9 WILL BE COLLECTED BY AN UNDERDRAIN / STORM SYSTEM SYSTEM AND BE PIPED TO THE EXISTING LAGOON TO THE SOUTH EAST OF THE SITE. BIORETENTION FACILITIES #12 & #13 CONNECT TO AN EXISTING INLET AND 12" STORM SYSTEM CROSSING NORTH ROGERS ROAD AND OUTFALLING TO THE WEST, THE PIER SIDE OF SEWELL'S POINT.

SEQUENCE OF CONSTRUCTION

1. SCHEDULE A PRE–CONSTRUCTION MEETING ON SITE WITH NAVY TO REVIEW SEDIMENT AND EROSION CONTROL REQUIREMENTS AND SEQUENCE OF CONSTRUCTION BEFORE ANY WORK IS DONE.
2. THE CONTRACTOR SHALL STAKE OUT LIMITS OF DISTURBANCE PRIOR TO PRE–CONSTRUCTION MEETING.
3. THE CONTRACTOR SHALL PROVIDE PERIMETER SEDIMENT AND EROSION CONTROL MEASURES INCLUDING SILT FENCE (SF), AND CONSTRUCTION ENTRANCE (CE).
4. CONSTRUCT STORM SYSTEM AND FILTER FABRIC PROTECTION AS DESCRIBED IN THE EROSION CONTROL NARRATIVE ON THIS SHEET.
5. GRADE SITE TO SUBGRADE ELEVATIONS AND COMPACT AS SPECIFIED. INSTALL BASE STONE AND ASPHALT PAVEMENT.
6. DO NOT INITIATE CONSTRUCTION OF BIORETENTION FACILITIES WHEN THERE IS RAIN FORECAST WITHIN 4 DAYS.
7. CONVERT THE TEMPORARY SEDIMENT TRAPS TO PERMANENT BIORETENTION FACILITIES AS DESCRIBED BELOW.
8. STABILIZE ANY ADDITIONAL AREAS DISTURBED BY BIORETENTION INSTALLATION WITHIN SEVENTY–TWO (24) HOURS OF COMPLETION OF BACKFILL OF IMPORTED BIORETENTION SOIL MIX.
9. INSTALL VEGETATION AS SPECIFIED ON THE PLANTING PLAN. CONSTRUCTION TIME: 2 DAYS
10. UPON APPROVAL FROM THE NAVY, REMOVE ALL SEDIMENT AND EROSION CONTROL MEASURES.
11. CONTRACTOR SHALL SCHEDULE A POST–CONSTRUCTION INSPECTION WITH NAVY UPON CONSTRUCTION COMPLETION, SITE CLEAN UP AND APPROVAL.

EROSION AND SEDIMENT CONTROL NOTES:

1. PHASE 1 EROSION CONTROL CONSISTS OF A CONSTRUCTION ENTRANCE AND SILT FENCE AROUND THE PERIMETER OF THE PROJECT.

2A. PHASE 2 EROSION CONTROL MEASURES CONSIST OF PROTECTION FOR THE THE PROPOSED STORM SYSTEM. THE PROPOSED STORM SYSTEM IS TO BE INSTALLED PRIOR TO OTHER LAND DISTURBANCE TAKING PLACE. THE CRITICAL CONCERN IS TO PREVENT CLOGGING OF THE PERMANENT FILTER FABRIC LAYER WITH FINER GRAINED SEDIMENT.

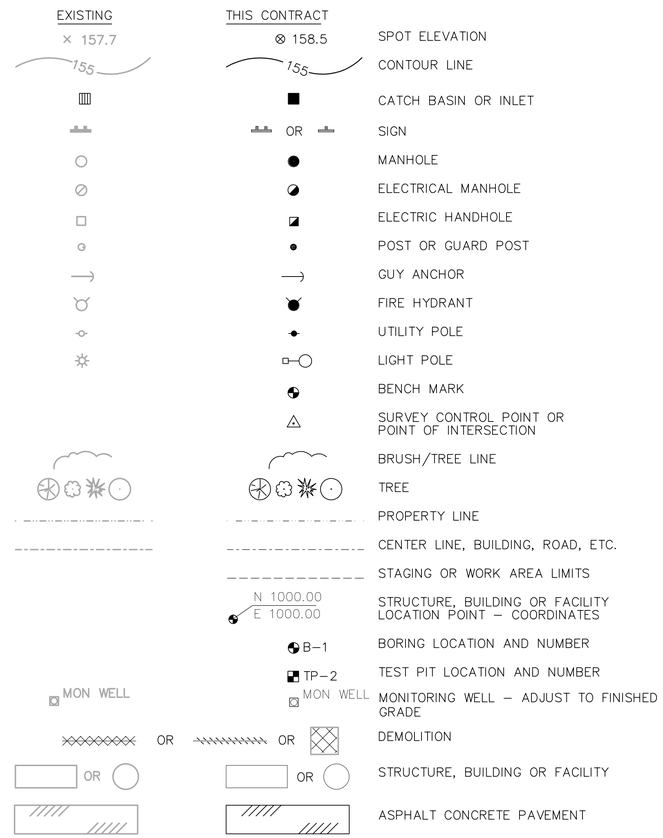
2.B INSTALL THE PERMANENT FILTER FABRIC LAYER ABOVE THE STORM PIPE AT THE ELEVATION OF THE BOTTOM OF THE BIORETENTION FACILITIES TO SERVE AS TEMPORARY SEDIMENT TRAPS UNTIL BASE AGGREGATE HAS BEEN INSTALLED. BECAUSE FILTER FABRIC DEGRADES IN ULTRAVIOLET LIGHT, A 2ND TEMPORARY LAYER OF FILTER FABRIC SHALL BE INSTALLED ON TOP OF THE PERMANENT ONE. ALSO INSTALL SILT FENCE ON THE UPHILL SIDE OF BIORETENTION AREAS.

2C. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE THE DOUBLE LAYER OF FILTER FABRIC. VACCUUMING MAY BE NEEDED. THE TOP TEMPORARY LAYER OF FILTER FABRIC IS TO BE REMOVED AND DISCARDED. THE PERMANENT FILTER FABRIC IS TO BE INSPECTED AND REPAIRED/REPLACED AS NEEDED PRIOR TO INSTALLATION OF THE BIORETENTION ENGINEERED SOIL MIX AND COMPLETION OF THE BIORETENTION FACILITES. THE SILT FENCE ON THE UPHILL SIDE OF EACH BIORETENTION FACILITY IS INTENDED TO REDUCE THE AMOUNT OF MAINTENANCE REQUIRED AT THIS POINT IN THE CONSTRUCTION PROCESS.

PLANTING SPECIFICATIONS

1. SEE SHEETS D–1 THROUGH D–3 FOR PLANTING LOCATIONS. PLANTING SCHEDULE IS ON SHEET D–3
2. ROOT STOCK OF THE PLANT MATERIAL SHALL BE KEPT MOIST DURING TRANSPORT FROM THE SOURCE TO THE JOB SITE AND UNTIL PLANTED.
3. WALLS OF PLANTING PIT SHALL BE DUG SO THAT THEY ARE VERTICAL.
4. THE DIAMETER OF THE PLANTING PIT MUST BE A MINIMUM OF SIX INCHES (6") LARGER HAN THE DIAMETER OF THE BALL OF THE TREE.
5. THE PLANTING PIT SHALL BE DEEP ENOUGH TO ALLOW 1/8 OF THE OVERALL DIMENSION OF THE ROOT BALL TO BE ABOVE GRADE. LOOSE SOIL AT THE BOTTOM OF THE PIT SHALL BE TAMPED BY HAND.
6. THE PLANT SHALL BE REMOVED FROM THE CONTAINER AND PLACED IN THE PLANTING PIT BY LIFTING AND CARRYING THE PLANT BY ITS' BALL (NEVER LIFT BY BRANCHES OR TRUNK).
7. SET THE PLANT STRAIGHT IN THE CENTER OF THE PIT SO THAT APPROXIMATELY 1/8 OF THE DIAMETER OF THE ROOT BALL IS ABOVE THE FINAL GRADE.
8. BACKFILL PLANTING PIT WITH EXISTING SOIL.
9. MAKE SURE PLANT REMAINS STRAIGHT DURING BACKFILLING PROCEDURE. MOUNT SOIL AROUND EXPOSED BALL.
10. NEVER COVER THE TOP OF THE BALL WITH SOIL.
11. TREES SHALL BE BRACED BY USING 2" BY 2" WHITE OAK STAKES. STAKES SHALL BE PLACED PARALLEL TO WALKWAYS AND BUILDINGS. STAKES ARE TO BE EQUALLY SPACED ON THE OUTSIDE OF TREE BALL. UTILIZING HOSE AND WIRE THE TREE IS BRACED TO THE STAKES.
12. BECAUSE OF THE HIGH LEVELS OF NUTRIENTS IN STORMWATER RUNOFF TO BE TREATED, BIORETENTION BASIN PLANTS SHOULD NOT REQUIRE CHEMICAL FERTILIZATION.

CIVIL LEGEND



PLANTING SOIL SPECIFICATIONS

1. PLANTING SOIL

THE BIORETENTION AREAS SHALL CONTAIN A ENGINEERED PLANTING / FILTERING SOIL MIXTURE IN ACCORDANCE WITH ONE OF THE TWO OPTIONS BELOW.

THE TOPSOIL SHALL BE FREE OF PLANTS OR PLANT PARTS, BERMUDA GRASS, QUACK GRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADIAN THISTLE OR OTHERS AS SPECIFIED. IT SHALL NOT CONTAIN TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH.

BIORETENTION SOIL MIXTURE	COMPOSITION BY VOLUME	
ITEM	OPTION #1	OPTION #2
TOPSOIL = SANDY LOAM OR LOAMY SAND OF UNIFORM COMPOSITION, CONTAINING NO MORE THAN 5% CLAY,	20%	
LEAF COMPOST: FULLY COMPOSTED, NOT PARTIALLY ROTTED LEAVES	30%	
SAND = ASTM C–33 CONCRETE SAND	50%	50%
PEAT, HEMIC OR FIBRIC		50%

THE PLANTING SOIL SHALL BE TESTED AND MEET THE FOLLOWING CRITERIA:

PH RANGE:	5.0 – 7.0
ORGANIC MATTER:	GREATER THAN 1.5
MAGNESIUM–(MG):	100 + UNITS
PHOSPHORUS–(P2 O5):	150 + UNITS
POTASSIUM–(K2O):	120 + UNITS
SOLUBLE SALTS:	NOT TO EXCEED 900 PPM/2.5 MMHOS/CM (SOIL MIX) NOT TO EXCEED 3,000 PPM/2.5 MMHOS/CM (ORGANIC MIX)

THE FOLLOWING TESTING FREQUENCIES SHALL APPLY TO THE ABOVE CONSTITUENTS:

PH. ORGANIC MATTER: 1 TEST PER 90 CUBIC YARDS, BUT NO MORE THAN 1 TEST PER BIORETENTION AREA

MAGNESIUM, PHOSPHORUS, SOLUBLE SALTS:

1 TEST PER 500 CUBIC YARDS, BUT NOT LESS THAN 1 TEST PER BORROW SOURCE

ONE GRAIN SIZE ANALYSIS SHALL PER PERFORMED PER 90 CUBIC YARDS OF PLANTING SOIL. BUT NO LESS THAN 1 TEST PER BIORETENTION AREA. SOIL TESTS MUST BE VERIFIED BY A QUALIFIED PROFESSIONAL.

2. MULCH

A MULCH LAYER SHALL BE PROVIDED ON TOP OF PLANTING SOIL. AN ACCEPTABLE MULCH LAYER SHALL BE SHREDDED HARDWOOD.
OF THE APPROVED MULCH PRODUCTS, ALL MUST BE WELL AGED, UNIFORM IN COLOR, AND FREE OF FOREIGN MATERIAL INCLUDING PLANT MATERIAL.

3. SAND

THE SAND FOR BIORETENTION BASINS, SHALL BE ASTM C–33 CONCRETE SAND AND FREE OF DELETERIOUS MATERIAL.

4. COMPACTION

SOIL SHALL BE PLACED IN LIFTS LESS THAN 18 INCHES AND LIGHTLY COMPACTED (MINIMAL COMPACTIVE EFFORT) BY TAMPING WITH A BUCKET FROM A DOZER OR A BACKHOE.

5. GRAVEL

THE GRAVEL LAYER OF THE BIORETENTION FACILITIES SHALL BE VDOT STANDARD 57 STONE, WASHED FREE OF FINES.

ABBREVIATIONS

EL	ELEVATION
EXST	EXISTING
NTS	NOT TO SCALE
TYP	TYPICAL

SYM	DESCRIPTION	DATE	APPR

NAVFAC

COMMONWEALTH OF VIRGINIA
HOWARD LUSK
Lic No. 034029
PROFESSIONAL ENGINEER

APPROVED
FOR COMMANDER NAVFAC
DATE

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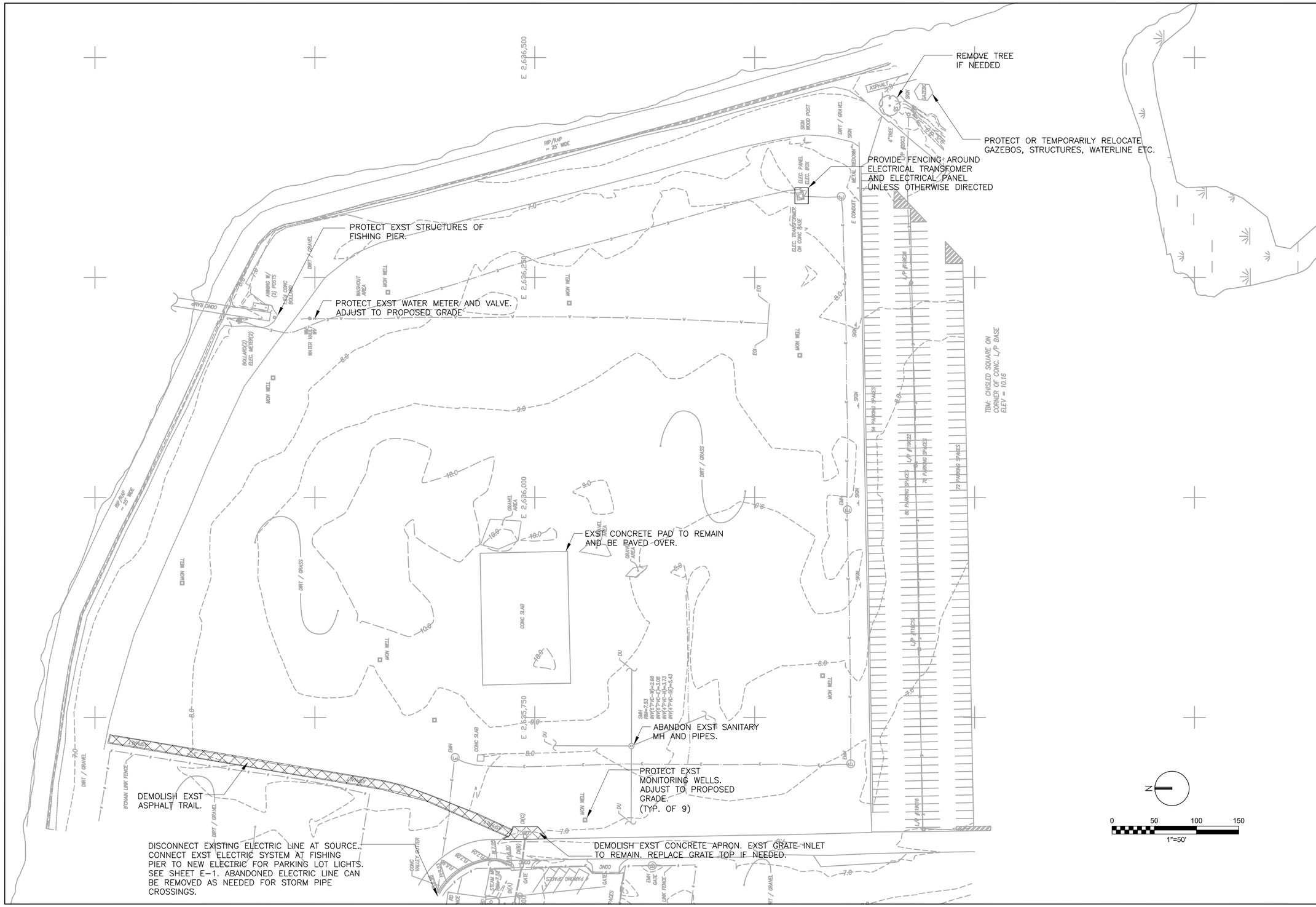
XXX
ACTIVITY – SATISFACTORY TO
DATE –

PM/DM
DES H.LUSK DRW J.KHAN CHK H.LUSK
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK
NAVAL FACILITIES ENGINEERING COMMAND ~
NAVAL STATION – NORFOLK, VIRGINIA
NAVAL STATION NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
CIVIL LEGEND, NOTES, AND ABBREVIATIONS

CODE ID. NO. 80091 SIZE D
SCALE: N.T.S.
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO. N62470–03–D–3052–0173
NAVFAC DRAWING NO. 12,000,202
SHEET 3 OF 18
G-2



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NAVAL STATION – NORFOLK, VIRGINIA

NAVAL STATION
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Q-AREA ASPHALT COVER

EXISTING SITE CONDITIONS AND DEMO PLAN

CODE ID. NO. 80091 | SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
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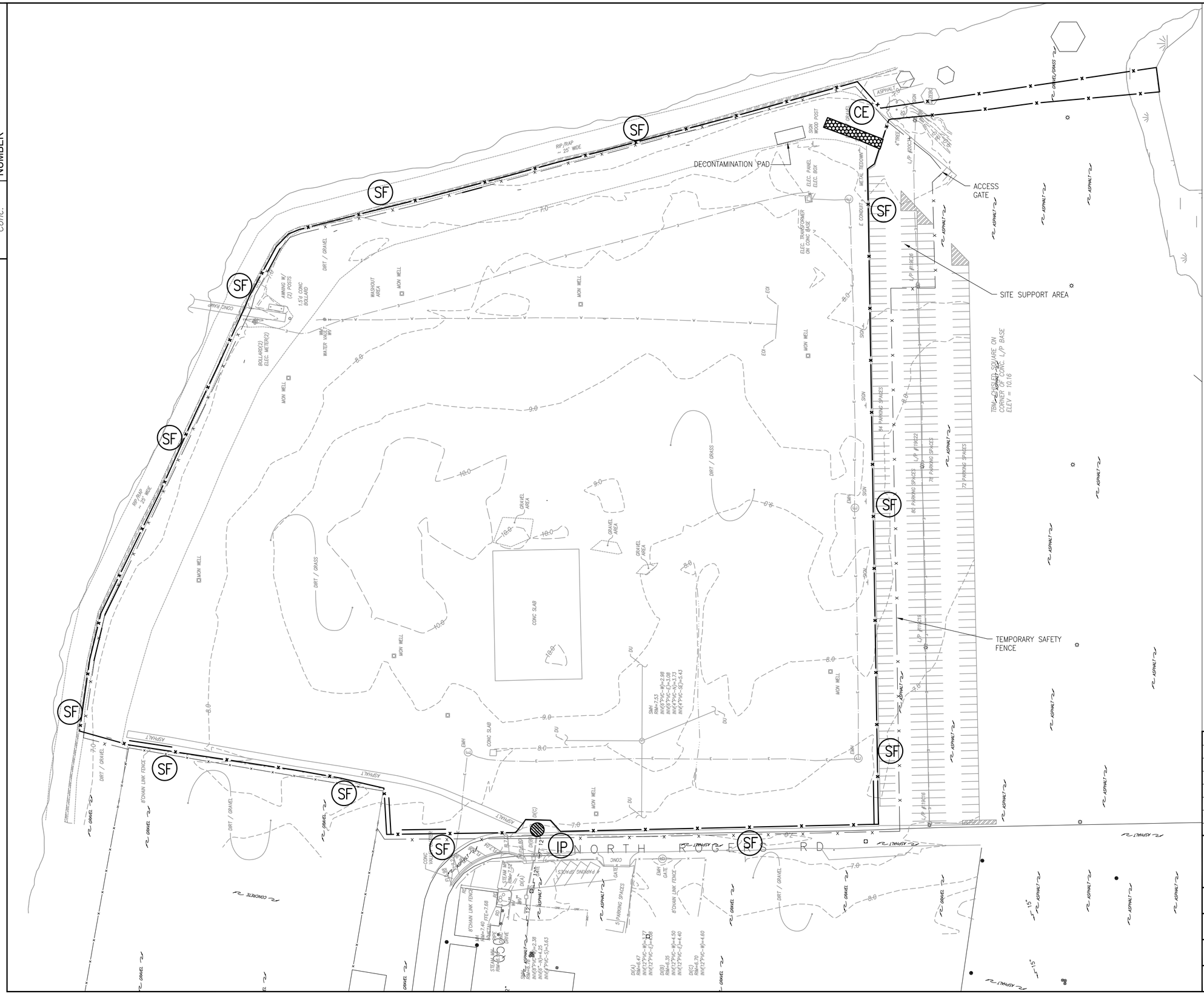
NAVFAC DRAWING NO. 12,000,203
SHEET 4 OF 18

C-1

OFFICE	DRAWING NUMBER
Conc.	129893-D1



NOTES:

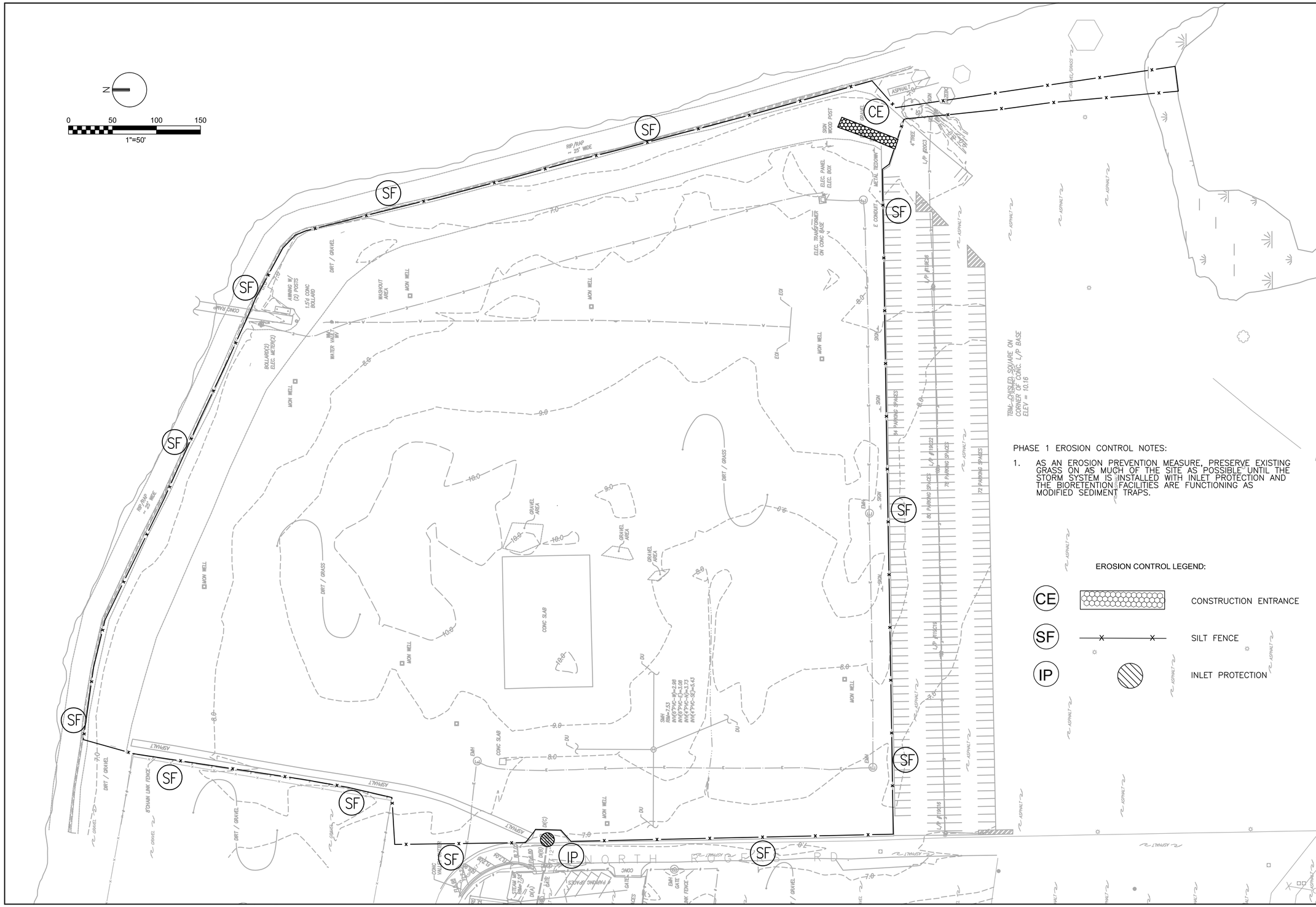
1. TEMPORARY SAFETY FENCE TO BE INSTALLED SURROUNDING THE CONSTRUCTION AREA IN ORDER TO CONTROL SITE ACCESS. TEMPORARY FENCE IS DESIGNED TO BE MOVEABLE DURING CONSTRUCTION TO PROVIDE ACCESS TO THE FISHING PIER, TO THE EXTENT SAFETY ALLOWS.
2. TO PREVENT DAMAGE, EXISTING MONITORING WELLS AND SITE STRUCTURES WILL BE CLEARLY MARKED PRIOR TO SITE CONSTRUCTION ACTIVITIES.

SCALE
0 50 100 150 FEET

REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw Environmental, Inc.

DESIGNED BY: ED	NAVAL FACILITIES ENGINEERING COMMAND FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK			
DRAWN BY: SJZ	SITE LAYOUT NAVAL STATION NORFOLK, VIRGINIA			
CHECKED BY: ED				
APPROVED BY: MR	DATE: 5/27/08	SCALE: AS SHOWN	DRAWING NO. 128893-D1	SHEET NO. C-1A



PHASE 1 EROSION CONTROL NOTES:

1. AS AN EROSION PREVENTION MEASURE, PRESERVE EXISTING GRASS ON AS MUCH OF THE SITE AS POSSIBLE UNTIL THE STORM SYSTEM IS INSTALLED WITH INLET PROTECTION AND THE BIORETENTION FACILITIES ARE FUNCTIONING AS MODIFIED SEDIMENT TRAPS.

EROSION CONTROL LEGEND:

CE		CONSTRUCTION ENTRANCE
SF		SILT FENCE
IP		INLET PROTECTION

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FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

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NAVAL STATION
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER

EROSION AND SEDIMENT CONTROL PHASE 1

CODE ID. NO. 80091 SIZE D
SCALE:
MAXIMO NO.
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WORK ORDER NO.
CONSTR. CONTR. NO. N62470-03-D-3052-0173
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SHEET 5 OF 18

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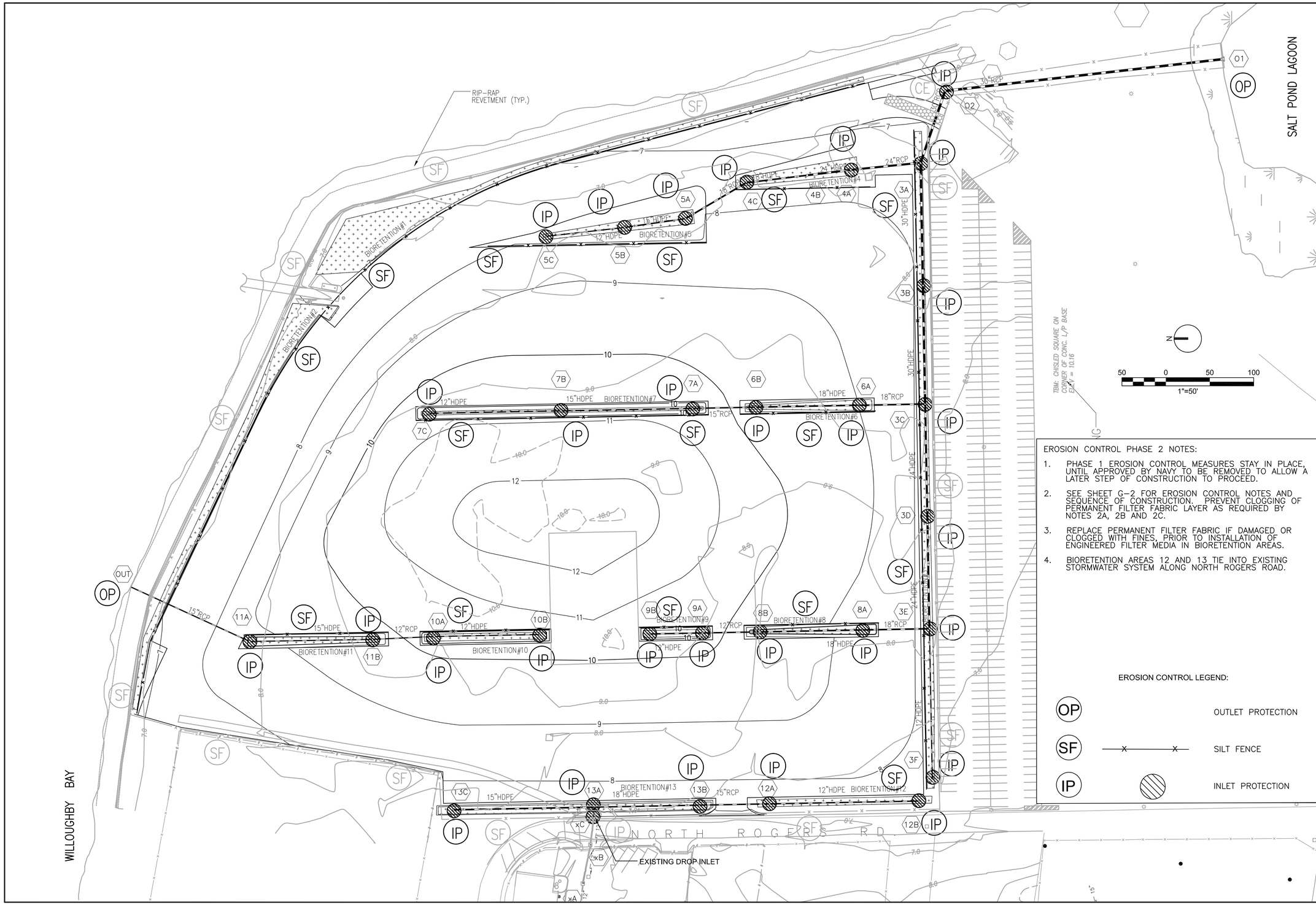

EROSION CONTROL PHASE 2 NOTES:

1. PHASE 1 EROSION CONTROL MEASURES STAY IN PLACE, UNTIL APPROVED BY NAVY TO BE REMOVED TO ALLOW A LATER STEP OF CONSTRUCTION TO PROCEED.
2. SEE SHEET G-2 FOR EROSION CONTROL NOTES AND SEQUENCE OF CONSTRUCTION. PREVENT CLOGGING OF PERMANENT FILTER FABRIC LAYER AS REQUIRED BY NOTES 2A, 2B AND 2C.
3. REPLACE PERMANENT FILTER FABRIC IF DAMAGED OR CLOGGED WITH FINES, PRIOR TO INSTALLATION OF ENGINEERED FILTER MEDIA IN BIORETENTION AREAS.
4. BIORETENTION AREAS 12 AND 13 TIE INTO EXISTING STORMWATER SYSTEM ALONG NORTH ROGERS ROAD.

EROSION CONTROL LEGEND:

OP	OUTLET PROTECTION
SF	SILT FENCE
IP	INLET PROTECTION

SYM	DESCRIPTION	DATE	APPR

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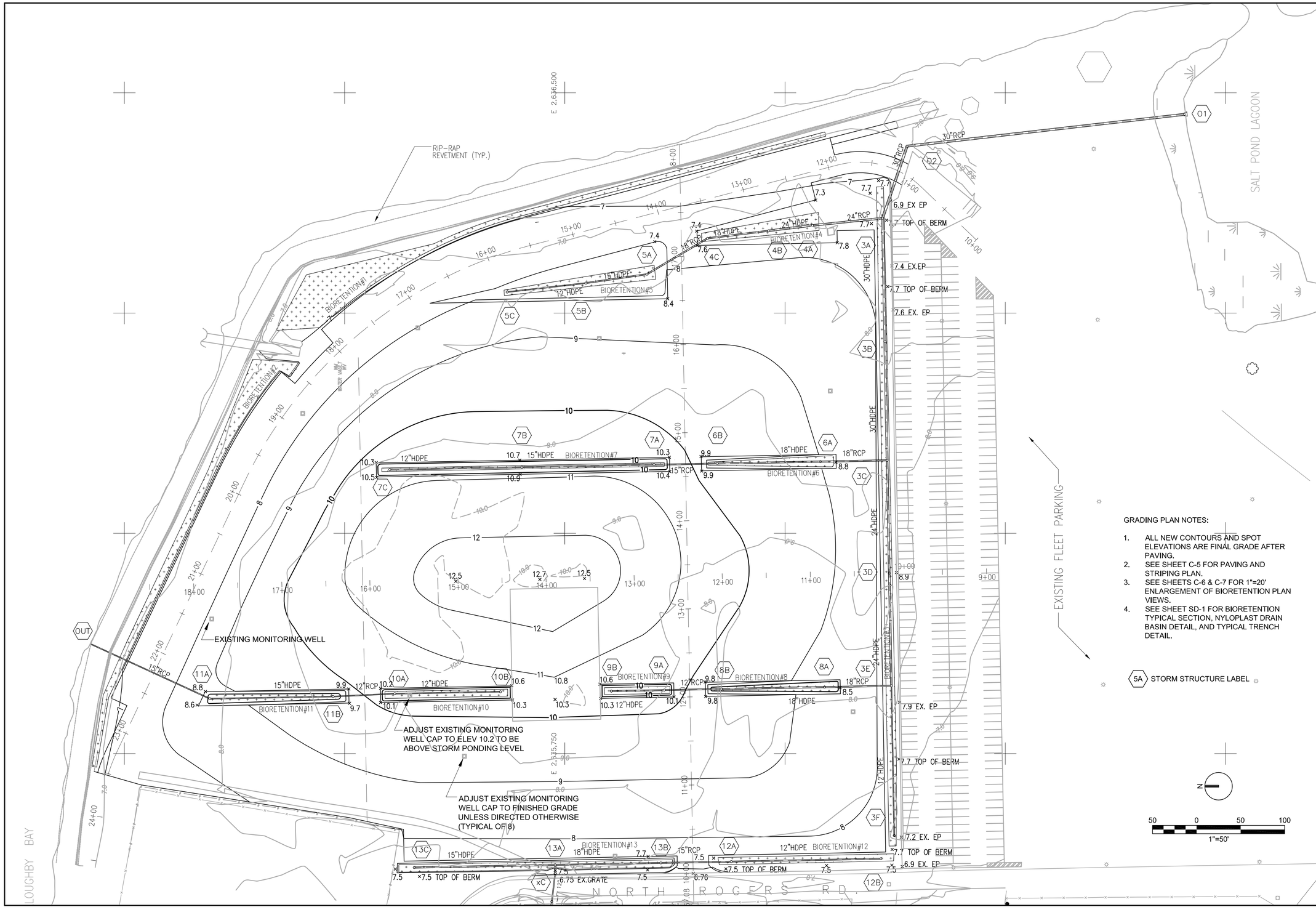
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
EROSION AND SEDIMENT CONTROL PHASE 2

CODE ID. NO. 80091 SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO. N62470-03-D-3052-0173
NAVFAC DRAWING NO. 12,000,205
SHEET 6 OF 18
C-3



GRADING PLAN NOTES:

1. ALL NEW CONTOURS AND SPOT ELEVATIONS ARE FINAL GRADE AFTER PAVING.
2. SEE SHEET C-5 FOR PAVING AND STRIPING PLAN.
3. SEE SHEETS C-6 & C-7 FOR 1"=20' ENLARGEMENT OF BIORETENTION PLAN VIEWS.
4. SEE SHEET SD-1 FOR BIORETENTION TYPICAL SECTION, NYLOPLAST DRAIN BASIN DETAIL, AND TYPICAL TRENCH DETAIL.

5A STORM STRUCTURE LABEL

SYM	DESCRIPTION	DATE	APPR

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Q-AREA ASPHALT COVER
GRADING PLAN

CODE ID. NO. 80091 SIZE D
SCALE:
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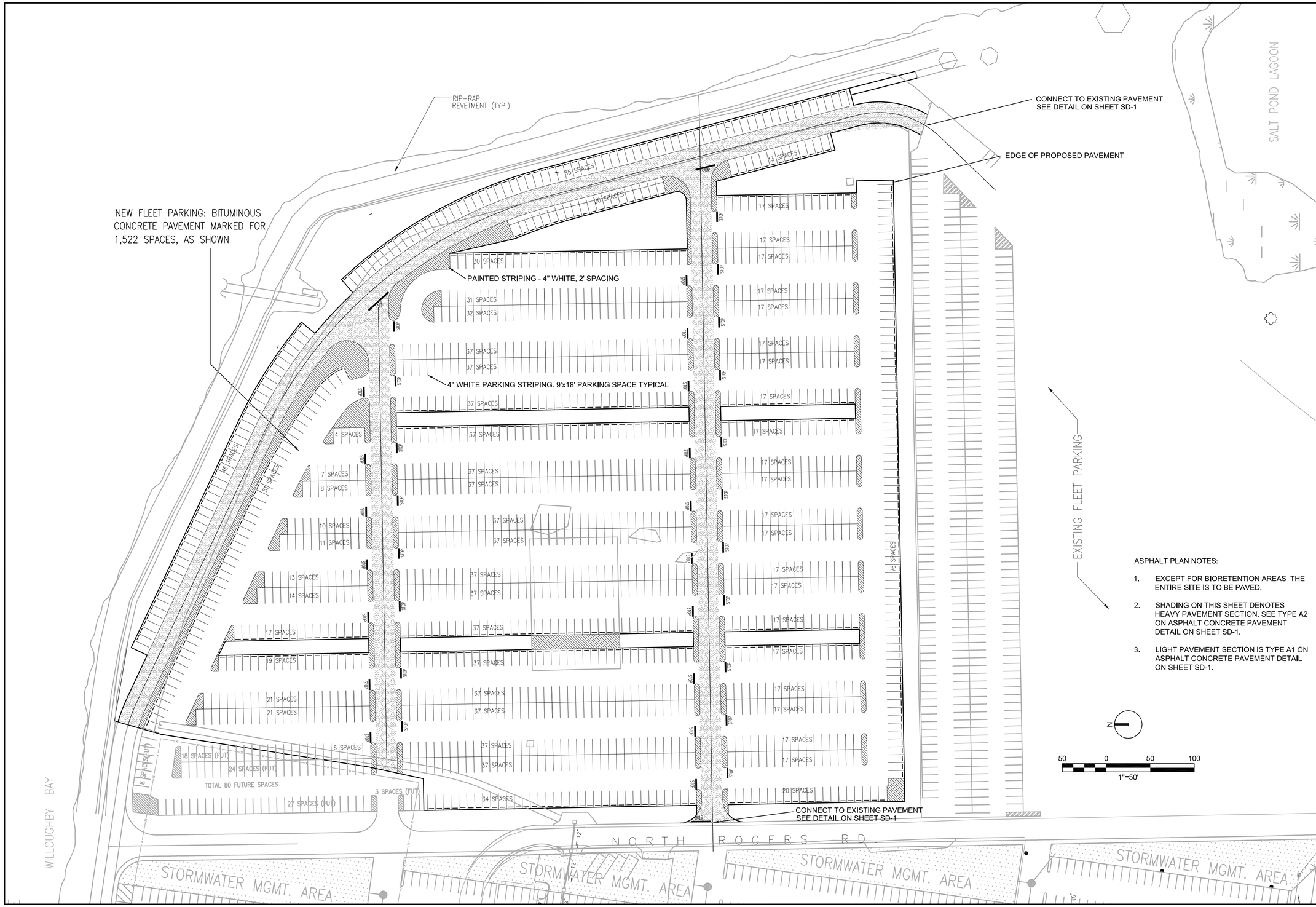
CONSTR. CONTR. NO. N62470-03-D-3052-0173
NAVFAC DRAWING NO. 12,000,206
SHEET 7 OF 18
C-4



ASPHALT PLAN NOTES:

1. EXCEPT FOR BIORETENTION AREAS THE ENTIRE SITE IS TO BE PAVED.
2. SHADING ON THIS SHEET DENOTES HEAVY PAVEMENT SECTION. SEE TYPE A2 ON ASPHALT CONCRETE PAVEMENT DETAIL ON SHEET SD-1.
3. LIGHT PAVEMENT SECTION IS TYPE A1 ON ASPHALT CONCRETE PAVEMENT DETAIL ON SHEET SD-1.

SYM	DESCRIPTION	DATE	APPR

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Q-AREA ASPHALT COVER
ASPHALT PLAN

CODE ID. NO. 80091 SIZE D
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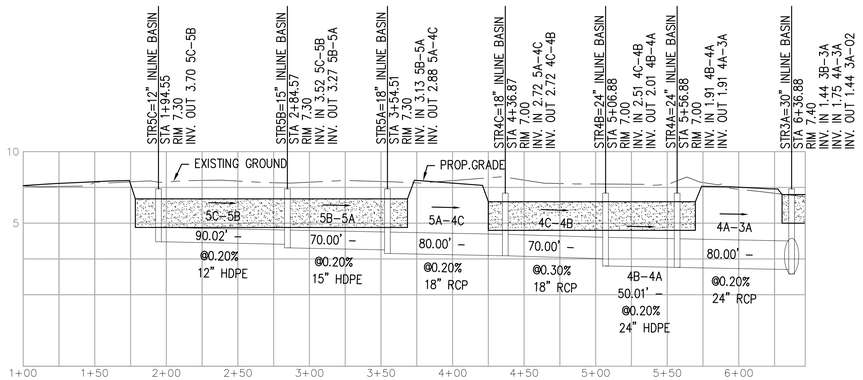
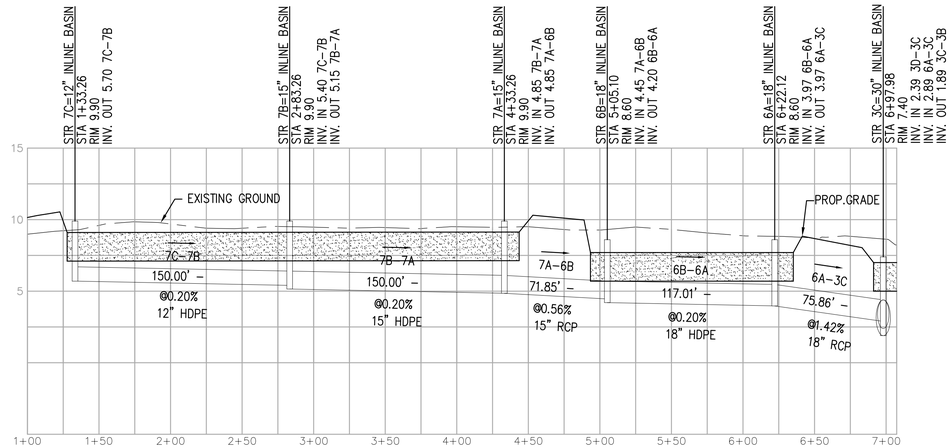
CONSTR. CONTR. NO. N62470-03-D-3052-0173
NAVFAC DRAWING NO. 12,000,207
SHEET 8 OF 18
C-5



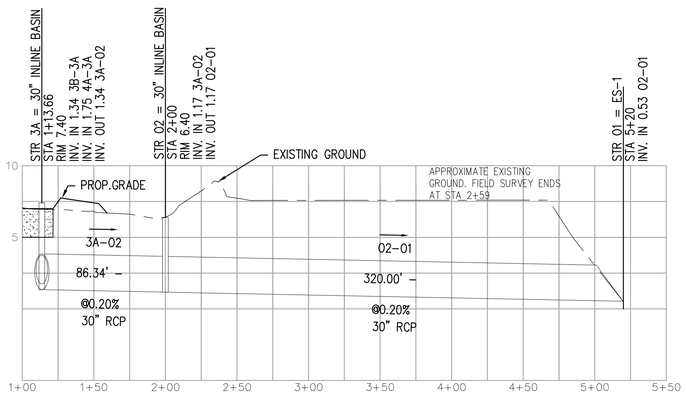
BIORETENTION FACILITIES #4 & #5

1"=50' H, 1"=5' V



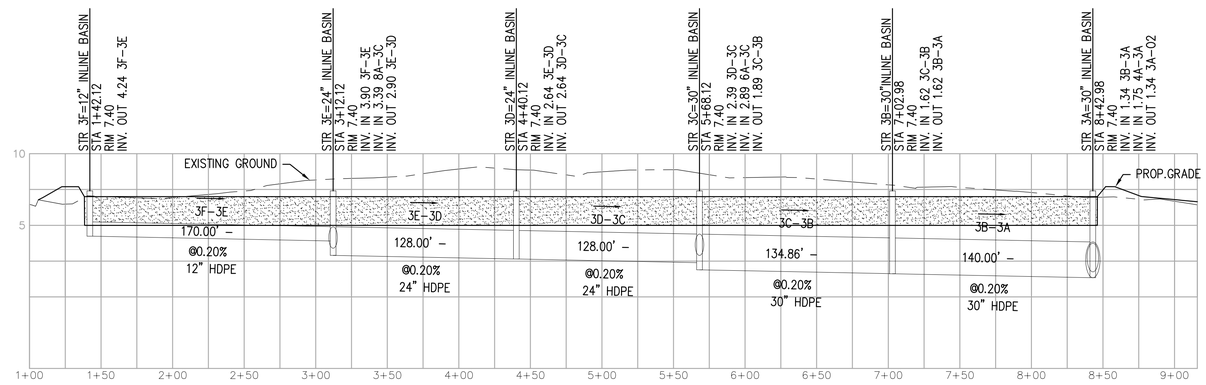
BIORETENTION FACILITIES #6 & #7

1"=50' H, 1"=5' V



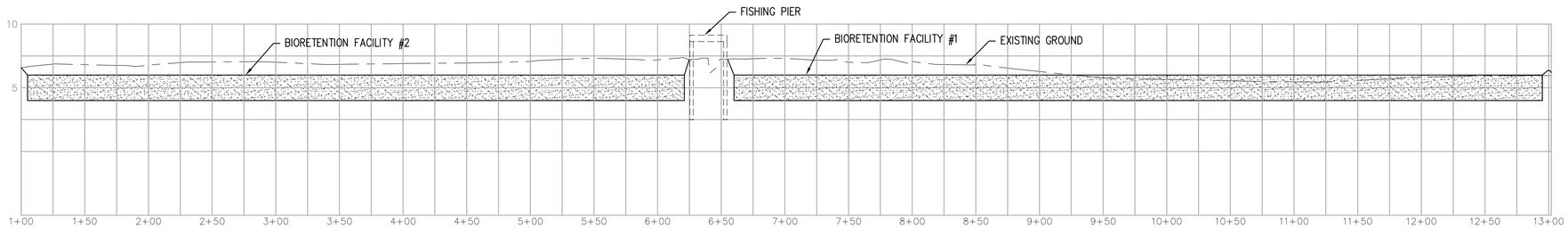
STORM OUTFALL TO LAGOON

1"=50' H, 1"=5' V



BIORETENTION FACILITY #3

1"=50' H, 1"=5' V



BIORETENTION FACILITY #1 & #2

1"=50' H, 1"=5' V

NOTES:

1. SEE SHEET SD-1 FOR TYPICAL SECTION OF BIORETENTION FACILITIES.
2. BIORETENTION FACILITIES #1 & #2 DO NOT HAVE UNDERDRAINS, BUT INSTEAD HAVE A PERMEABLE FILTER FABRIC ON THE SIDE TOWARDS THE REVETMENT.

50 0 50 100

1"=50'

SYM	DESCRIPTION	DATE	APPR

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FIRE PROTECTION –
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CHIEF ENG/ARCH

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NAVAL STATION NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
STORM PROFILES

CODE ID. NO. 80091 SIZE D
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SHEET 9 OF 18
C-6

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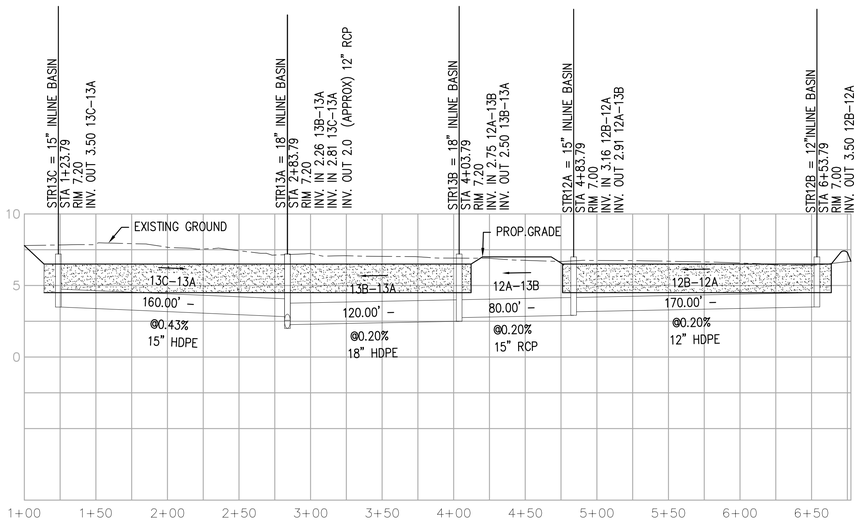
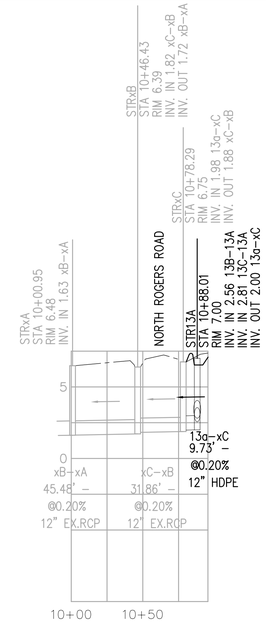


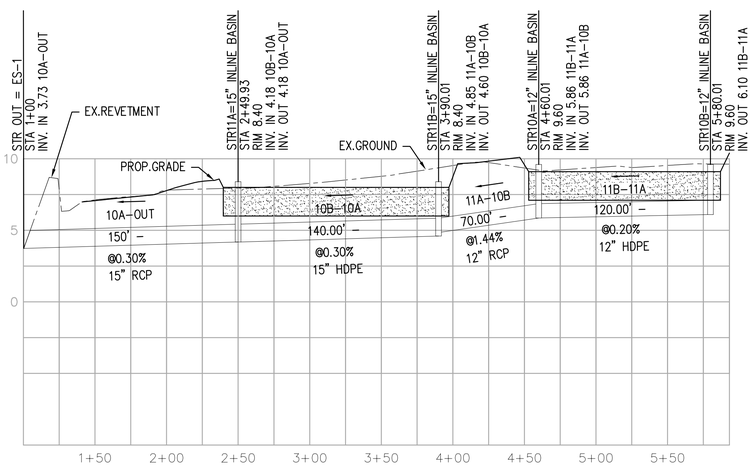
BIORETENTION FACILITIES #12 & #13

1"=50' H, 1"=5' V



STORM CONNECTION TO EXISTING PIPE SYSTEM

1"=50' H, 1"=5' V

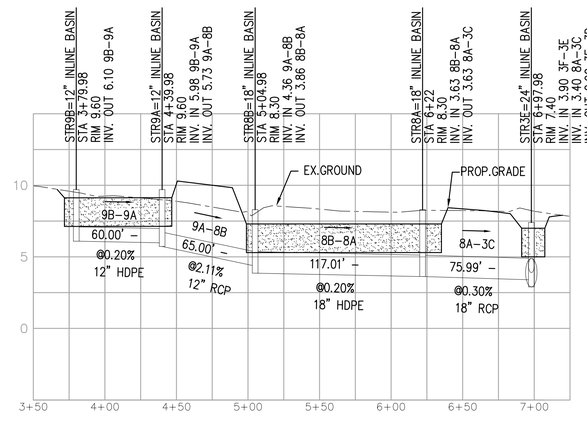


BIORETENTION FACILITIES #10 & #11

1"=50' H, 1"=5' V

NOTES:
1. SEE SHEET SD-1 FOR TYPICAL SECTION OF BIORETENTION FACILITIES.

50 0 50 100
1"=50'



BIORETENTION FACILITIES #8 & #9

1"=50' H, 1"=5' V

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Q-AREA ASPHALT COVER
STORM PROFILES

CODE ID. NO. 80091 SIZE D
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SHEET 10 OF 18
C-7

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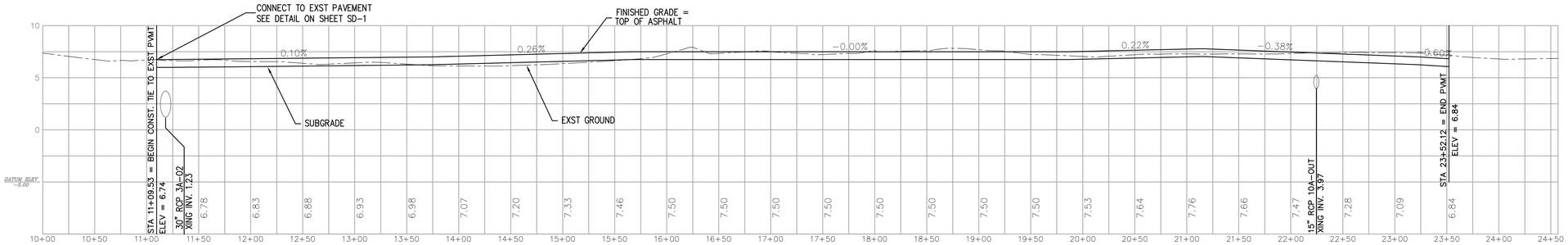
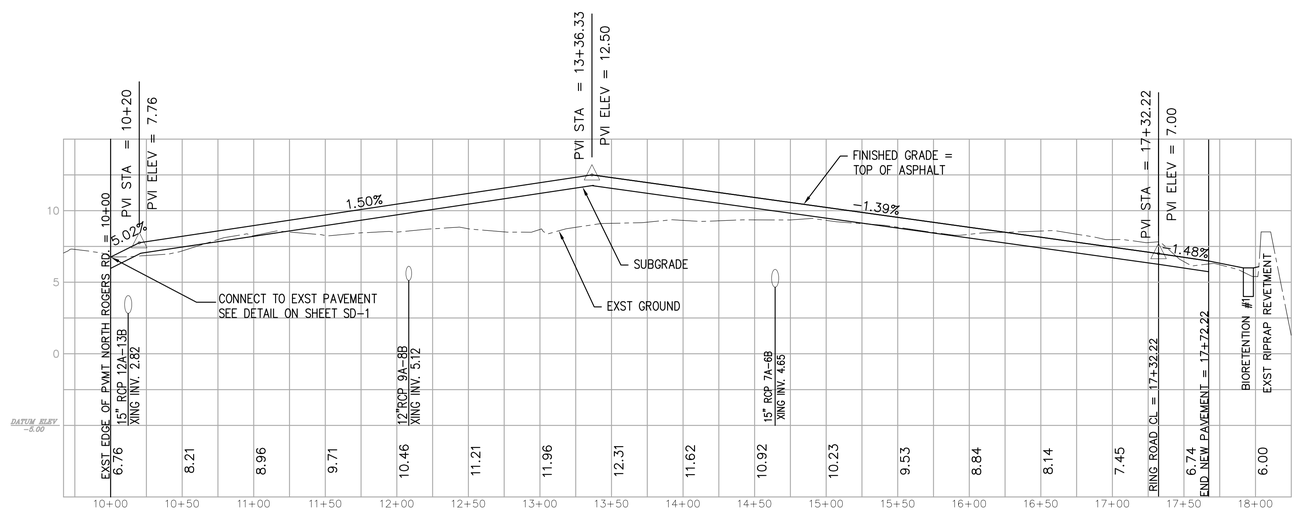


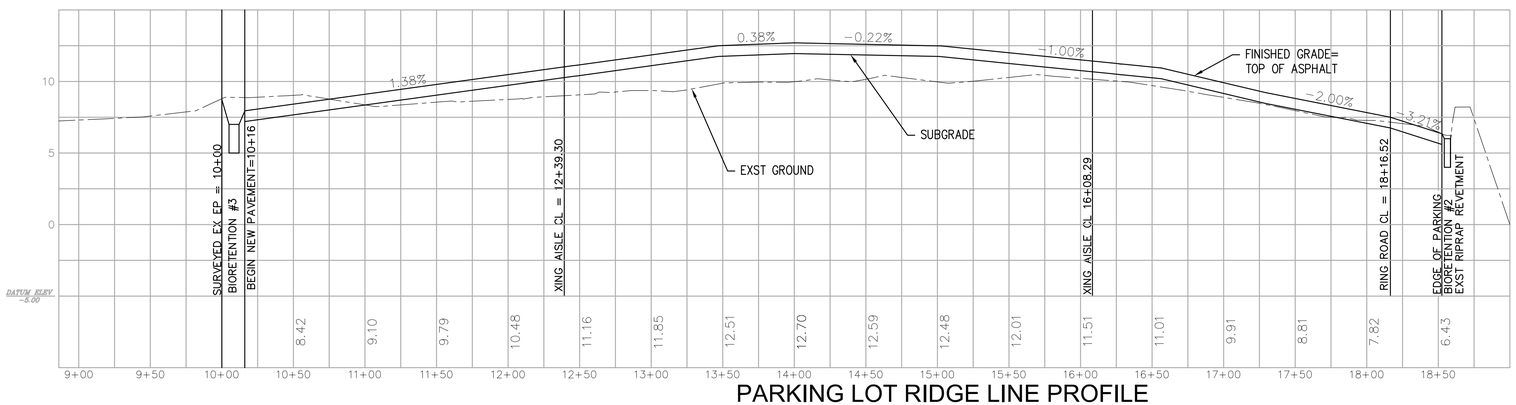
RING ROAD PROFILE

1"=50'



MAIN AISLE PROFILE

1"=50'



PARKING LOT RIDGE LINE PROFILE

1"=50'

50 0 50 100

1"=50'

SYM	DESCRIPTION	DATE	APPR

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FIRE PROTECTION –

BRANCH MANAGER

CHIEF ENG/ARCH

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NAVAL STATION
NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER

PARKING PROFILES

CODE ID. NO. 80091 SIZE D

SCALE:

MAXIMO NO.

JOB ORDER NO.

WORK ORDER NO.

CONSTR. CONTR. NO.
N62470-03-D-3052-0173

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12,000,210

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C-8

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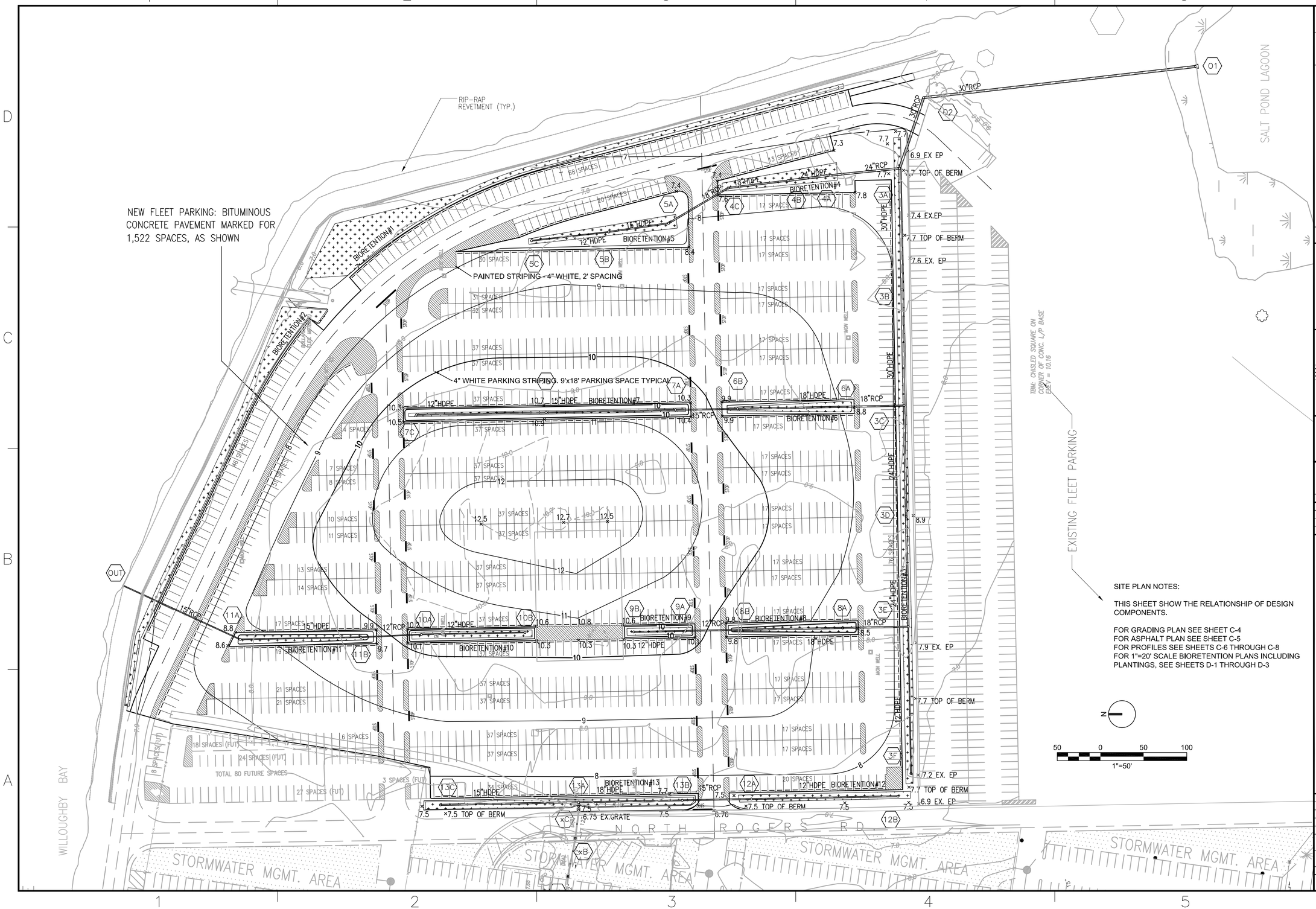

SITE PLAN NOTES:

THIS SHEET SHOW THE RELATIONSHIP OF DESIGN COMPONENTS.

FOR GRADING PLAN SEE SHEET C-4
FOR ASPHALT PLAN SEE SHEET C-5
FOR PROFILES SEE SHEETS C-6 THROUGH C-8
FOR 1"=20' SCALE BIORETENTION PLANS INCLUDING PLANTINGS, SEE SHEETS D-1 THROUGH D-3

SYM	DESCRIPTION	DATE	APPR

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SITE PLAN

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WORK ORDER NO.
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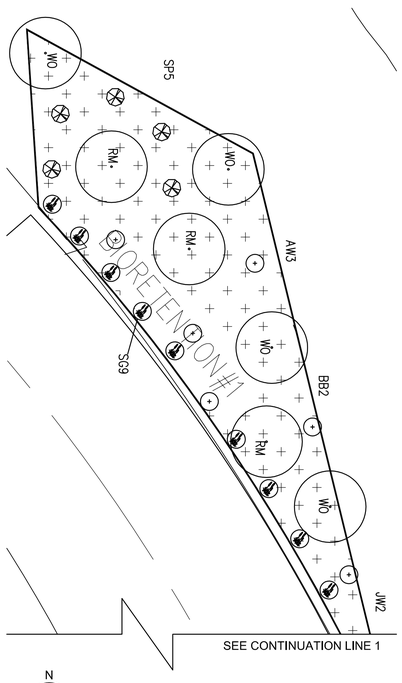
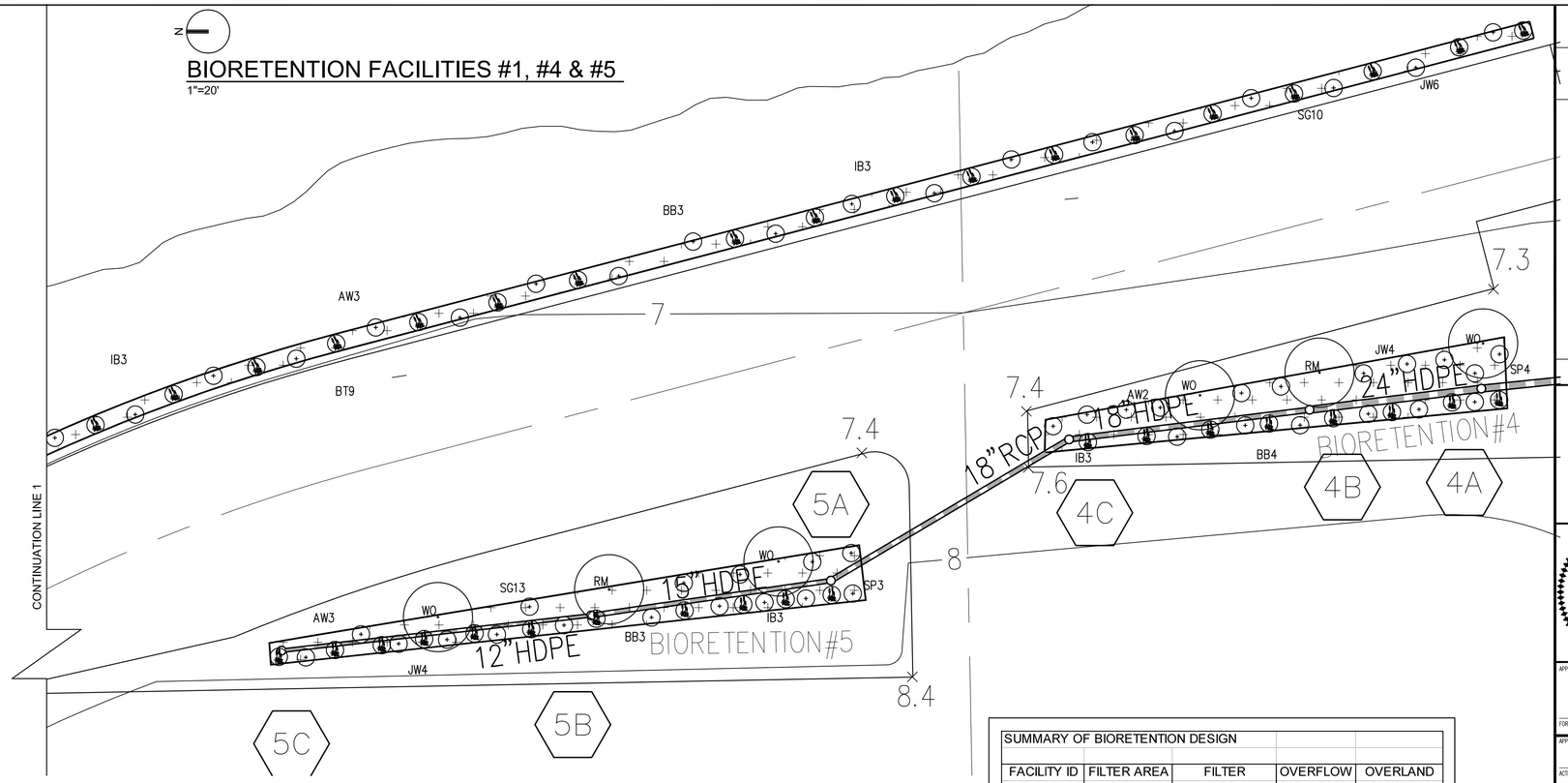
NAVFAC DRAWING NO. 12,000,211
SHEET 12 OF 18

C-9

DRAWFORM REVISION: 6 AUG 2007



BIORETENTION FACILITY #1
1"=20'



BIORETENTION FACILITIES #1, #4 & #5
1"=20'

LANDSCAPING LEGEND

xx. TREE - SPECIES ID

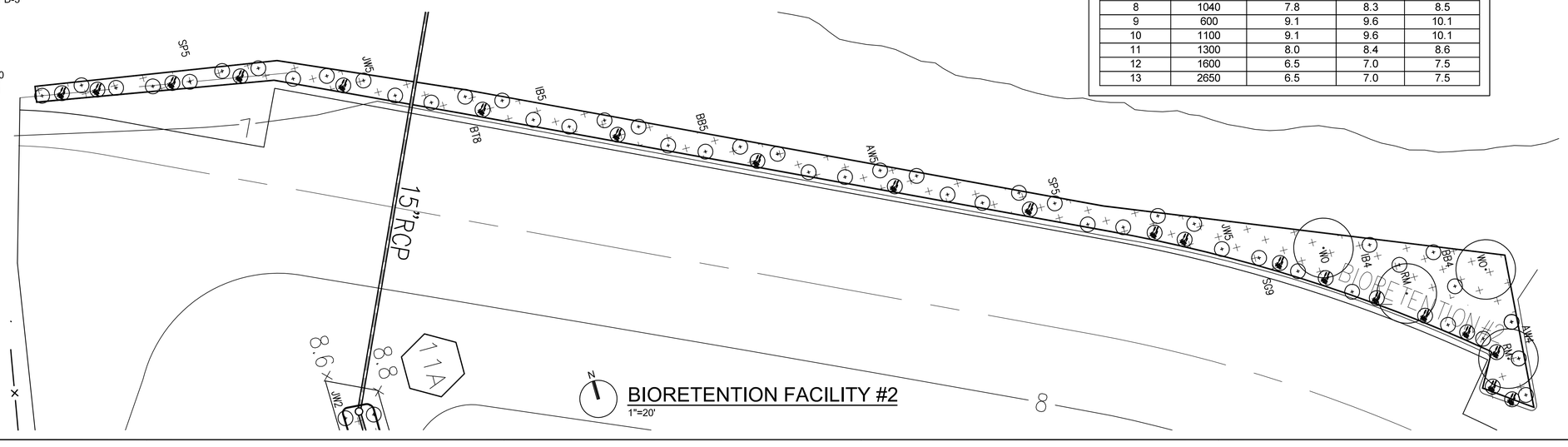
xx# SHRUB - SPECIES ID & QUANTITY

xx# GRASS - SPECIES ID & QUANTITY

SEE PLANTING SCHEDULE ON SHEET D-3

20 0 20 40
1"=20'

SUMMARY OF BIORETENTION DESIGN				
FACILITY ID	FILTER AREA (SF)	FILTER SURFACE ELEV	OVERFLOW INLET ELEV	OVERLAND RELIEF ELEV
1	3600	6.0	NA	6.9
2	5070	6.0	NA	7.0
3	6080	7.0	7.4	7.7
4	2000	6.5	7.0	7.3
5	1890	6.7	7.3	7.6
6	1070	8.2	8.6	8.7
7	1280	9.3	9.9	10.3
8	1040	7.8	8.3	8.5
9	600	9.1	9.6	10.1
10	1100	9.1	9.6	10.1
11	1300	8.0	8.4	8.6
12	1600	6.5	7.0	7.5
13	2650	6.5	7.0	7.5



BIORETENTION FACILITY #2
1"=20'

MARK	DATE	DESCRIPTION	INIT

NAVFAC

COMMONWEALTH OF VIRGINIA
HOWARD LUSK
Lic No. 034029
PROFESSIONAL ENGINEER

APPROVED
FOR COMMANDER NAVFAC
DATE

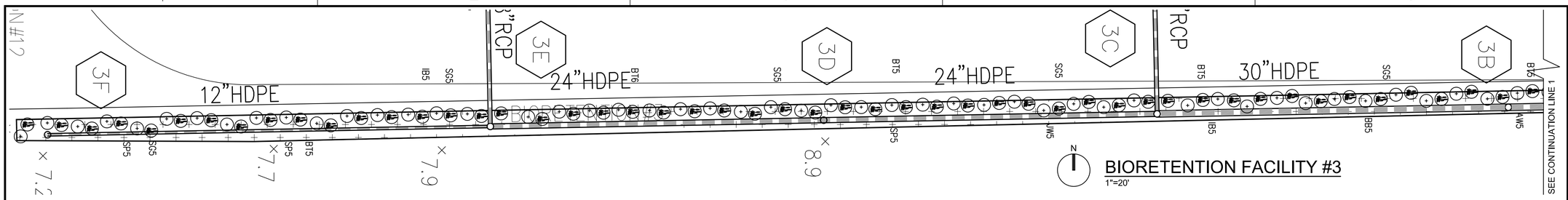
APPROVED
XXX
ACTIVITY – SATISFACTORY TO
DATE –

PM/DM
DES H.LUSK DRW J.KHAN CHK H.LUSK
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

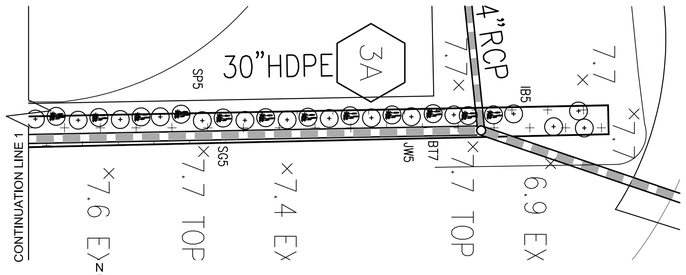
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK
NAVAL FACILITIES ENGINEERING COMMAND ~
NAVAL STATION – NORFOLK, VIRGINIA
NAVAL STATION NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
BIORETENTION DETAILS

CODE ID. NO. 80091 SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO. N62470-03-D-3052-0173
NAVFAC DRAWING NO. 12,000,212
SHEET 13 OF 18

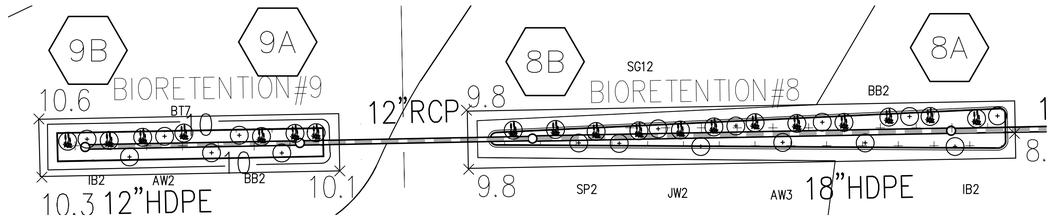
D-1



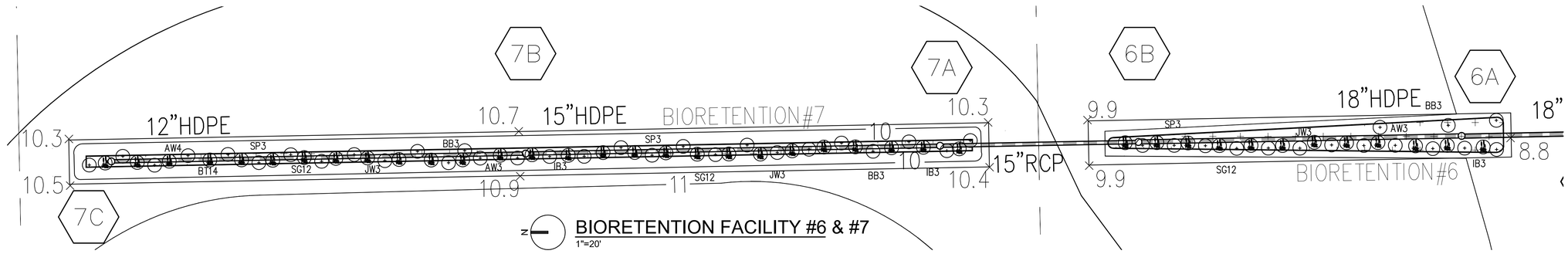
BIORETENTION FACILITY #3
1"=20'



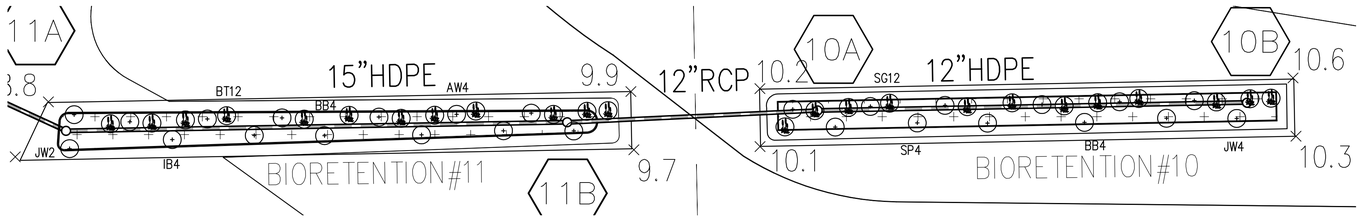
BIORETENTION FACILITY #3
1"=20'



BIORETENTION FACILITIES #8 & #9
1"=20"



BIORETENTION FACILITY #6 & #7
1"=20'



BIORETENTION FACILITY #10 & #11
1"=20'

LANDSCAPING LEGEND

xx# SHRUB - SPECIES ID & QUANTITY

xx# GRASS - SPECIES ID & QUANTITY

SEE PLANTING SCHEDULE ON SHEET D-3

20 0 20 40
1"=20'

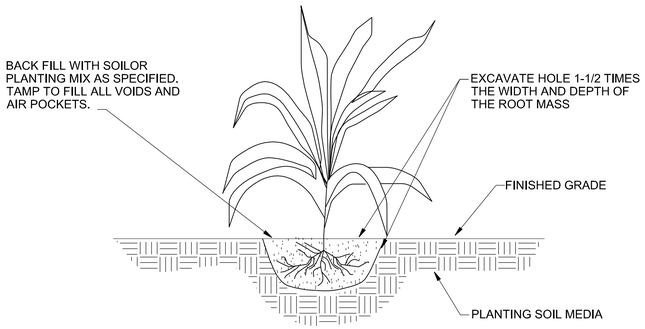
DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK	NAVAL FACILITIES ENGINEERING COMMAND ~ NAVAL STATION - NORFOLK, VIRGINIA
NAVAL STATION	NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT Q-AREA ASPHALT COVER	BIORETENTION DETAILS
CODE ID. NO. 80091	SIZE D
SCALE:	
MAXIMO NO.	
JOB ORDER NO.	
WORK ORDER NO.	
CONSTR. CONTR. NO.	N62470-03-D-3052-0173
NAVFAC DRAWING NO.	12,000,213
SHEET 14 OF 18	D-2

DRAWFORM REVISION: 6 AUG 2007

APPROVED
FOR COMMANDER NAVFAC DATE
APPROVED XXX
ACTIVITY - SATISFACTORY TO DATE –
PM/DM
DES H.LUSK DRW I.KHAN CHK H.LUSK
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

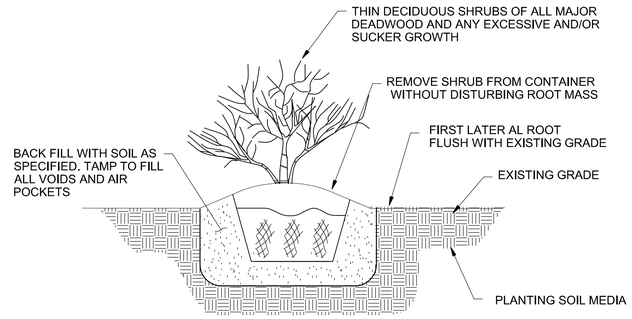
HOWARD LUSK
Lic No. 034029
COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER

APPR	DATE	DESCRIPTION	SYM



HERBACEOUS PLANTING DETAIL

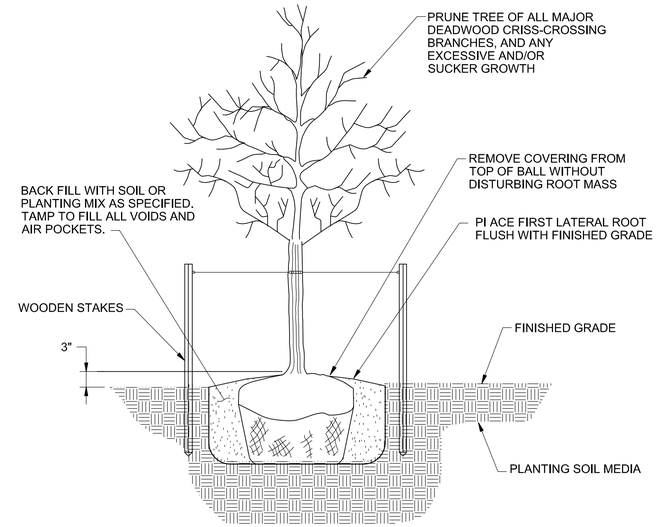
NTS



1. EXCAVATE HOLE 1-1/2 TIMES THE WIDTH OF THE ROOT MASS.
2. REMOVE ALL NON-ORGANIC MATERIAL FROM THE PLANTING PIT AND TAMP LOOSE SOIL IN BOTTOM OF PIT BY HAND.

CONTAINER SHRUB PLANTING

NTS



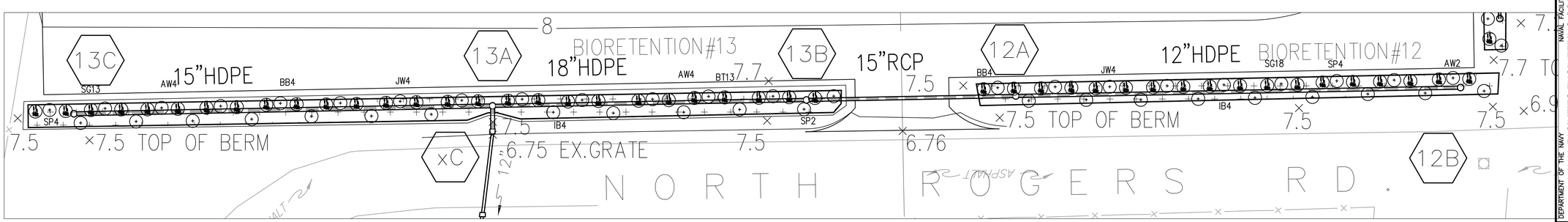
1. EXCAVATE HOLE 1-1/2 TIMES THE WIDTH AND DEPTH OF THE ROOT MASS
2. REMOVE ALL NON-ORGANIC MATERIAL COMPLETELY

BALLED-IN-BURLAP TREE PLANTING DETAIL

NTS

Planting Schedule — Quantity for each Bioretention Facility

Symbol	Scientific Name	Common Name	Type	Root	Size	1	2	3	4	5	6	7	8	9	10	11	12	13	Total per species
WO	Quercus phellos	willow oak	Tree	B&B	2" cal.	4	2		2	2									10
RM	Acer rubrum	red maple	Tree	B&B	2" cal.	3	2		1	1									7
SP	Clethra ainfolia	sweet pepperbush	Shrub	Cont.	1 Gal	5	10	15	4	3	3	6	2		4	2	4	6	64
JW	Hypericum densiflorum	St. John's wort	Shrub	Cont.	1 Gal	8	10	15	4	4	3	6	2		4	4	4	4	68
IB	Ilex glabra	inkberry	Shrub	Cont.	1 Gal	6	9	15	3	3	3	6	2	2			4	4	57
BB	Myrica pennsylvanica	bayberry	Shrub	Cont.	1 Gal	5	9	10	4	3	3	6	2	2	4	4	4	4	60
AW	Viburnum dentatum	arrow wood	Shrub	Cont.	1 Gal	6	9	10	2	3	3	7	2	2		4	2	8	58
BT	Lotus Corniculatus	birdsfoot trefoil	Grass	Cont.	1 Gal	9	8	28	8			14		7		12		13	99
SG	Panicum virgatum	switch grass	Grass	Cont.	1 Gal	19	9	25		13	12	12	12		12		18	13	145
					Total per Facility	65	68	118	28	32	27	57	22	13	24	26	36	52	568



BIORETENTION FACILITY #13

1"=20'

BIORETENTION FACILITY #12

1"=20'

N

20 0 20 40

1"=20'

LANDSCAPING LEGEND

xx# SHRUB - SPECIES ID & QUANTITY

xx# GRASS - SPECIES ID & QUANTITY

SYM	DESCRIPTION	DATE	APPR

NAVFAC

COMMONWEALTH OF VIRGINIA
HOWARD LUSK
Lic No. 034029
PROFESSIONAL ENGINEER

APPROVED

FOR COMMANDER NAVFAC
DATE

APPROVED
XXX
ACTIVITY – SATISFACTORY TO DATE –

PM/DM
DESIGN H.LUSK DRWN I.KHAN CHK H.LUSK
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK

NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION – NORFOLK, VIRGINIA

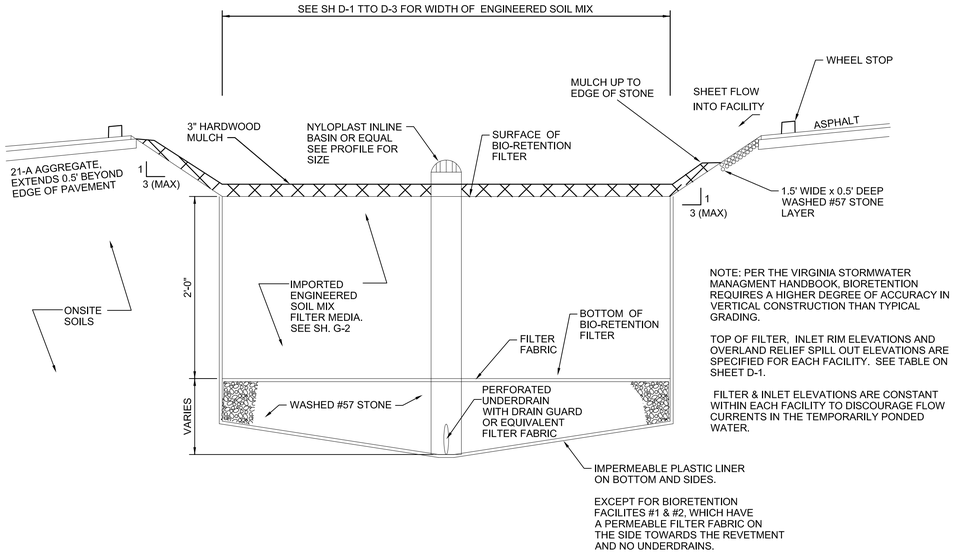
NAVAL STATION
NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER

BIORETENTION DETAILS AND PLANTING SCHEDULE

CODE ID. NO. 80091 SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO.
N62470-03-D-3052-0173
NAVFAC DRAWING NO.
12,000,214
SHEET 15 of 18

D-3

DRAWFORM REVISION: 6 AUG 2007



NOTE: PER THE VIRGINIA STORMWATER MANAGMENT HANDBOOK, BIORETENTION REQUIRES A HIGHER DEGREE OF ACCURACY IN VERTICAL CONSTRUCTION THAN TYPICAL GRADING.

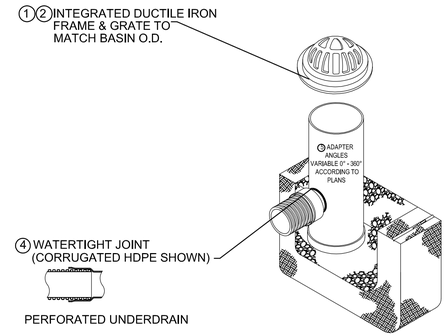
TOP OF FILTER, INLET RIM ELEVATIONS AND OVERLAND RELIEF SPILL OUT ELEVATIONS ARE SPECIFIED FOR EACH FACILITY. SEE TABLE ON SHEET D-1.

FILTER & INLET ELEVATIONS ARE CONSTANT WITHIN EACH FACILITY TO DISCOURAGE FLOW CURRENTS IN THE TEMPORARILY PONDED WATER.

BIORETENTION TYPICAL SECTION

NTS

NYLOPLAST INLINE DRAIN BASIN:



THE BACKFILL MATERIAL SHALL BE CRUSHED STONE OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS II MATERIAL AS DEFINED IN ASTM D2321. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.

1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE BRONZE GRATE.

2 - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05

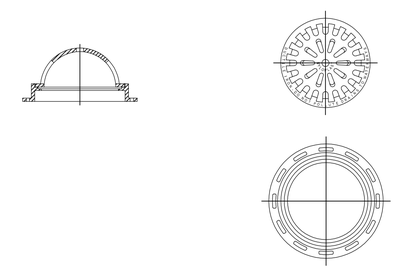
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065

4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC

INLINE DRAIN BASIN QUICK SPEC INSTALLATION DETAIL

NTS

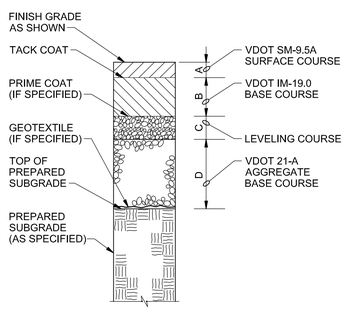
DOME GRATES ARE PREFERED FOR BETTER PERFORMANCE IN THE EVENT OF FLOATING DEBRIS



NOTE:
ALL DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE
QUALITY: MATERIAL SHALL CONFORM TO ASTM A536 GRADE 70-50-05
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
LOCKING DEVICE AVAILABLE UPON REQUEST SEE DWG. No. 7001-110-229

DOME GRATE ASSEMBLY

NTS



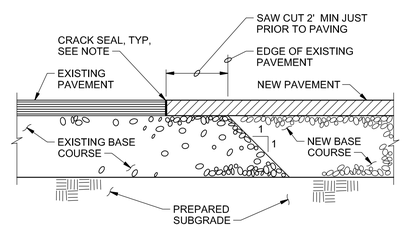
PAVEMENT TYPE(S)	DIMENSION (INCHES)			
	A	B	C	D
AI	2	-	-	7
A2	1.5	2	-	5.5

NOTE:

PROVIDE ASPHALT CONCRETE PAVEMENT TYPE AS SHOWN SHEET C5.

ASPHALT CONCRETE PAVEMENT

NTS

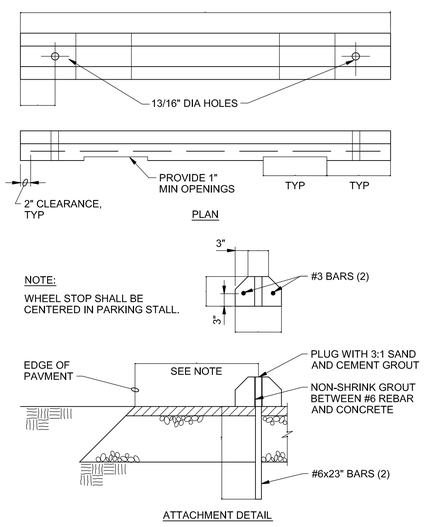


NOTE:

PAINT EDGE OF EXISTING ASPHALT WITH TACK COAT PRIOR TO PAVING. CRACK SEAL JOINT AFTER PAVING OPERATION HAS BEEN COMPLETED.

PAVEMENT CONNECTION

NTS

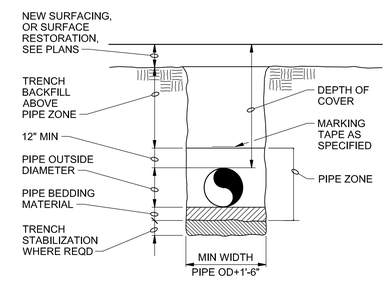


NOTE:

WHEEL STOP SHALL BE CENTERED IN PARKING STALL.

PRECAST CONCRETE WHEEL STOP

NTS



TYPICAL TRENCH

NTS

SYM	DESCRIPTION	DATE	APPR

NAVFAC

COMMONWEALTH OF VIRGINIA
HOWARD LUSK
Lic No. 034029
PROFESSIONAL ENGINEER

APPROVED
FOR COMMANDER NAVFAC DATE
APPROVED XXX
ACTIVITY – SATISFACTORY TO DATE –
PM/DM
DES H.LUSK DRW I.KHAN CHK H.LUSK
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

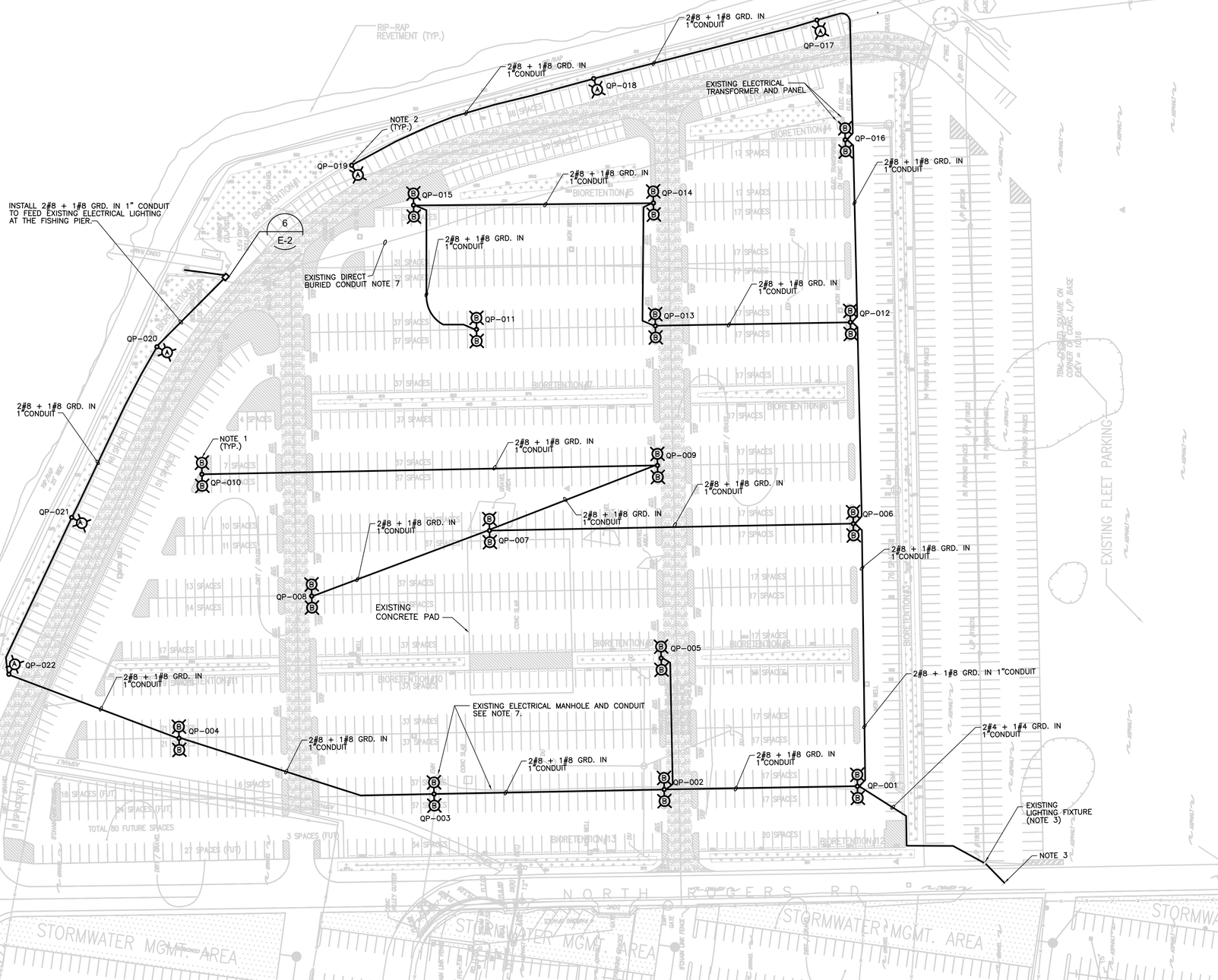
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK
NAVAL FACILITIES ENGINEERING COMMAND ~ NAVAL STATION – NORFOLK, VIRGINIA
NAVAL STATION NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
STANDARD AND PAVING DETAILS

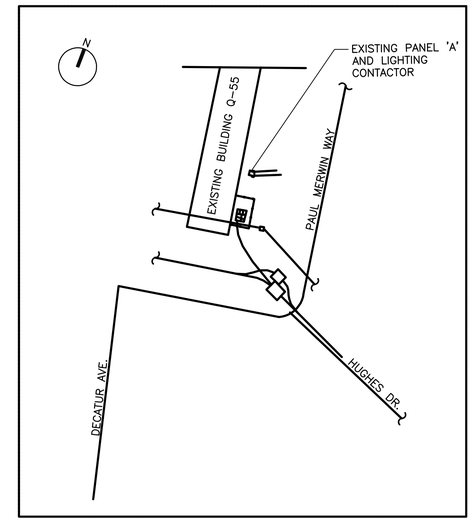
CODE ID. NO. 80091 SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO. N62470-03-D-3052-0173
NAVFAC DRAWING NO. 12,000,215
SHEET 16 OF 18
SD-1

DRAWFORM REVISION: 6 AUG 2007

NOTES:

1. TWO TYPE 'B' LIGHTING FIXTURE MOUNTED ON 40' HIGH ROUND TAPERED FIBERGLASS POLE. SEE DRAWING E-02 FOR DETAILS.
2. TWO TYPE 'B' LIGHTING FIXTURE MOUNTED ON 40' HIGH ROUND TAPERED FIBERGLASS POLE. SEE DRAWING E-02 FOR DETAILS.
3. PROVIDE 2#4+1#4 GRD. IN 1 1/4" CONDUIT TO PANEL 'A'. APPROX. DISTANCE IS 350FT. CONTRACTOR TO CONFORM. PROVIDE 40A, 2P, 480V, 14 KAIC RATED CIRCUIT BREAKER IN EXISTING PANEL 'A' TO MATCH EXISTING PANELBOARD MANUFACTURER MODEL.
4. FOOTCANDLE VALUES FOR PARKING LOT SHALL BE AS FOLLOWS. AVERAGE FC VALUE > 1.0, UNIFORMITY RATIO AVE/MIN < 5/1.
5. ALL NEW LIGHTING FIXTURES SHALL BE CONNECTED TO EXISTING LIGHTING CONTACTOR LOCATED NEAR EXISTING PANEL 'A'. EXISTING PANEL "A", 480/277V AT TRANSFORMER Q-56A THE LOAD BUS SWITCHED BY A PHOTO-CONTROLLED 150A CONTACTOR, PROVIDE SPARE CONTACTOR IF REQUIRED.
6. PROVIDE ALL MATERIAL, LABOR, INSTALLATION FOR A COMPLETE LIGHTING SYSTEM, EVEN IF NOT SHOWN ON THE DRAWING.
7. DISCONNECT AND REMOVE EXISTING ELECTRICAL CONDUIT AND FEEDER FROM THE SOURCE.





PARTIAL SITE PLAN
N.T.S.

N

0 50 100 150
1"=50'

			APPR
			DATE
			DESCRIPTION
			SYM

NAVFAC

COMMONWEALTH OF VIRGINIA
PEDRO DeJESUS III
Lic. No. 025723
PROFESSIONAL ENGINEER

APPROVED

FOR COMMANDER NAVFAC DATE

APPROVED XXX

ACTIVITY - SATISFACTORY TO DATE –

PM/DM

DES I.KHAN | DRW I.KHAN | CHK D.DOAR

FIRE PROTECTION –

BRANCH MANAGER

CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK

NAVAL FACILITIES ENGINEERING COMMAND ~
NAVAL STATION - NORFOLK, VIRGINIA

NAVAL STATION
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER

NORFOLK, VIRGINIA

SITE LIGHTING - OVERALL PLAN

CODE ID. NO. 80091 | SIZE D

SCALE:

MAXIMO NO.

JOB ORDER NO.

WORK ORDER NO.

CONSTR. CONTR. NO. N62470-03-D-3052-0173

NAVFAC DRAWING NO. 12,000,216

SHEET 17 OF 18

E-1

DRAWFORM REVISION: 6 AUG 2007

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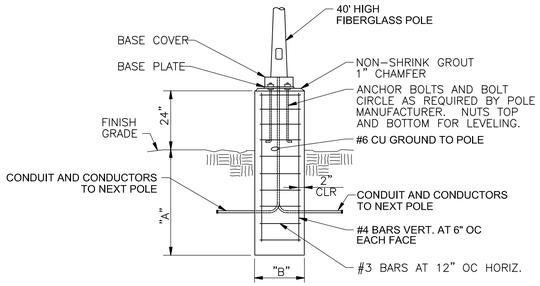
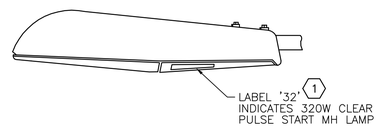


MAX POLE HEIGHT	"A"	"B"
40'	54"	36"

NOTES:
1. USE STAINLESS STEEL NUTS AND LOCKWASHERS.
2. INSTALL 2 CONDUITS (MINIMUM) PER POLE.
3. CONDUITS SHALL BE STUBBED UP TO WITHIN 6 INCHES OF THE POLE HANDHOLE.
4. FOR PROPER ORIENTATION OF POLE, COORDINATE WITH SITE PLANS.

1 POLE FOOTING DETAIL
NTS

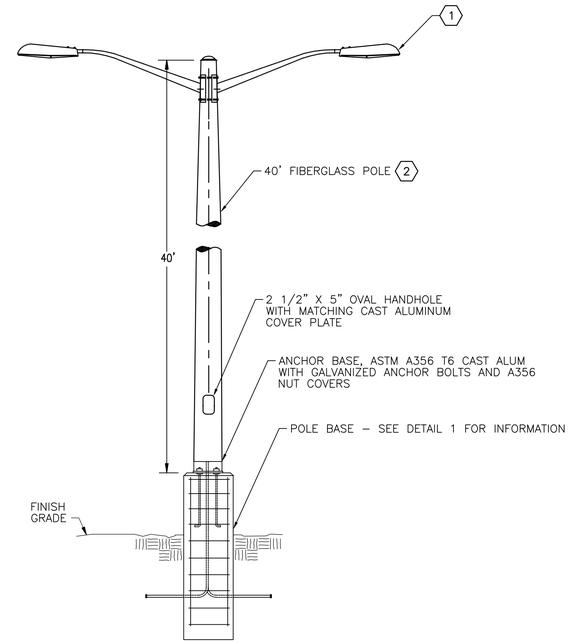


LUMINAIRE REQUIREMENTS

1. REFRACTOR – FLAT GLASS.
2. REFLECTOR – ANODIZED ALUMINUM.
3. HOUSING – DIE CAST ALUMINUM, WITH BAKED ENAMEL GRAY FINISH.
4. HINGED ALUMINUM DOOR WITH GASKET AND LATCH
5. INTEGRAL BALLAST – TYPE AND VOLTAGE AS SPECIFIED.
6. ALL HARDWARE, STAINLESS STEEL, OR NONCORROSIVE
7. ADJUSTABLE PORCELAIN SOCKET.
8. 1-1/4" TO 2", SLIPFITTER.
9. LAMP – 320W CLEAR PULSE START METAL HALIDE.

2 PARKING AREA LIGHTING FIXTURE
NTS

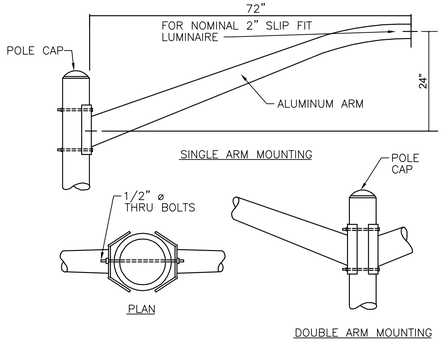
XL-4

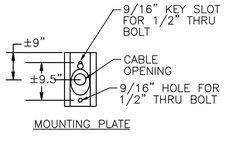


3 PARKING AREA POLE DETAIL
NTS

LEGEND

- NEW 40' FIBERGLASS POLE, ANCHOR BASE TYPE ON CONCRETE FOUNDATION, WITH SINGLE LIGHT FIXTURE, POLE NUMBER INDICATED
- NEW 40' FIBERGLASS POLE, ANCHOR BASE TYPE ON CONCRETE FOUNDATION, WITH DOUBLE LIGHT FIXTURES, POLE NUMBER INDICATED
- NEW CONDUIT
- EXISTING CONDUIT



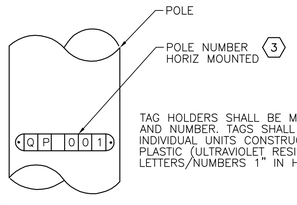


MOUNTING ARM DIMENSIONS		
TYPE	WIDTH	HEIGHT / (RISE)
XL-31	72"	24"

NOTE :
ALL MOUNTING HARDWARE FOR ARMS
SHALL BE HOT DIP GALVANIZED.

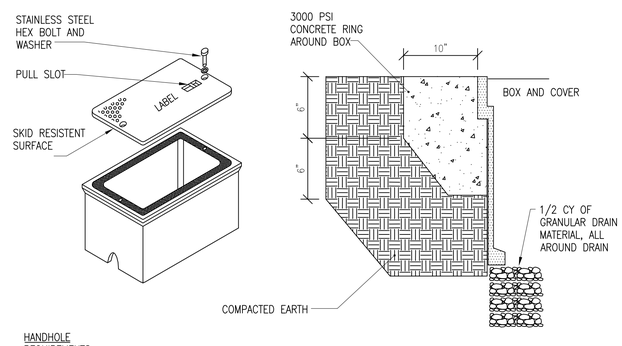
4 LUMINAIRE MOUNTING ARM
NTS

XL-31



TAG HOLDERS SHALL BE METAL-1 1/2" LETTER AND NUMBER. TAGS SHALL BE MOLDED PLASTIC INDIVIDUAL UNITS CONSTRUCTED OF YELLOW PLASTIC (ULTRAVIOLET RESISTANT) WITH BLACK LETTERS/NUMBERS 1" IN HEIGHT.

5 POLE NUMBERING DETAIL
NTS



HANDHOLE
REQUIREMENTS

1. HOUSING SHALL BE A POLYMER CONCRETE REINFORCED WITH A HEAVY WEAVE FIBERGLASS REINFORCING WITH COMPRESSIVE STRENGTH OF NO LESS THAN 10,000 psi.
2. COVER AND BOX SHALL WITHSTAND A SERVICE LOAD OF NO LESS THAN 15,000 LBS OVER A 10" x 10" AREA. HAND HOLES IN ROADWAYS SHALL BE DESIGNED TO WITHSTAND H-20 LOADING.
3. PROVIDE STAINLESS STEEL BOLTS AND INSERTS.
4. PROVIDE WITH (2) 2 1/2" MOUSEHOLES. RUN CONDUIT STRAIGHT INTO MOUSEHOLE. DO NOT TURN CONDUIT UP INTO HANDHOLE.
5. PROVIDE LABEL "ELECTRICAL" ON COVER.

TYPE	HANDHOLE SIZING
5	12" X 12" X 24" DEEP
6	12" X 18" X 24" DEEP
7	12" X 24" X 24" DEEP
8	24" X 36" X 24" DEEP
9	30" X 48" X 24" DEEP

6 COMPOSITE HANDHOLE
NTS

NOTES:

1. PROVIDE TYPE XL-4 320W CLEAR MH LIGHTING FIXTURES WITH FLAT GLASS LENS, ALUMINUM REFLECTOR IES TYPE R3 FULL CUTOFF, 320W CLEAR PULSE START METAL HALIDE LAMP AND 320W SCWA PULSE START BALLAST, 480V C/W DOUBLE 5 AMPS FUSE. LITHONIA TYPE CHM-320M-R3-FL-480-SCWA-LPI-UL-HSS-DF OR EQUAL. ID LAMP WATTS WITH STICKON LABEL, '32' IN 4" BLOCK CHARACTERS, AT THE BOTTOM OF EACH FIXTURE. EXTEND A MIN OF #8 AWG. CONDUCTORS TO THE LIGHTING FIXTURE TERMINALS.
2. PROVIDE TAPERED ROUND FIBERGLASS POLE, 40' ANCHOR BASE TYPE, WITH PROVISIONS FOR SINGLE AND DOUBLE LIGHTING FIXTURES MOUNTING ARMS, HANDHOLE, AND MOUNTING HARDWARE, SHAKESPEARE TYPE AC40-26-00-S2-BB-01 OR EQUAL. ASSEMBLY SHALL HAVE A 135MPH WIND RATING.
3. PROVIDE POLE ID LABELS 6' ABOVE FINISHED GRADE ON NORTH SIDE OF EACH POLE, NUMBERED AS INDICATED ON SHEET E-01 AND PER DETAIL ON THIS SHEET.
4. CONNECT EXISTING CIRCUIT A-2, "NORTHSIDE LIGHTS", THE CIRCUIT WITH 2P-60A BREAKER AND #4 COPPER FEEDER FEEDS ALL LIGHTS NORTH OF MASSEY HUGHES DRIVE

SYM	DESCRIPTION	DATE	APPR

NAVFAC

COMMONWEALTH OF VIRGINIA
PEDRO DeJESUS III
Lic. No. 025723
PROFESSIONAL ENGINEER

APPROVED
FOR COMMANDER NAVFAC DATE
APPROVED
XXX
ACTIVITY – SATISFACTORY TO DATE –
PM/DM
DES I.KHAN DRW I.KHAN CHK D.DOAR
FIRE PROTECTION –
BRANCH MANAGER
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING AND ACQUISITION DIVISION / PWD NORFOLK
NAVAL FACILITIES ENGINEERING COMMAND ~
NAVAL STATION – NORFOLK, VIRGINIA
NAVAL STATION NORFOLK, VIRGINIA
ENVIRONMENTAL REMEDIATION PROJECT
Q-AREA ASPHALT COVER
ELECTRICAL LEGEND AND DETAILS

CODE ID. NO. 80091 SIZE D
SCALE:
MAXIMO NO.
JOB ORDER NO.
WORK ORDER NO.
CONSTR. CONTR. NO.
N62470-03-D-3052-0173
NAVFAC DRAWING NO.
12,000,217
SHEET 18 OF 18
E-2
DRAWFORM REVISION: 6 AUG 2007

FILE NAME: C:\Documents and Settings\Ishan1\My Documents\NUMPro\\358444 - Naval Station - Landfill\dn03e003_358444.dwg LAYOUT NAME: Layout PLOTTED: Friday, May 16, 2008 - 11:31am USER: ikhan1

Appendix C

Health and Safety Plan

SITE SPECIFIC HEALTH AND SAFETY PLAN FOR SWMU-14 ASPHALT COVER – REMOVAL ACTION NAVAL STATION NORFOLK NORFOLK, VIRGINIA

Prepared for:

DEPARTMENT OF THE NAVY

Contract No. N62470-02-3260
Task Order 120

Prepared by:

Shaw Environmental, Inc.
500 East Main Street, Suite 1630
Norfolk, VA 23510

Shaw Project No. 129893
May 2008

Site Specific Health and Safety Plan Approval

Remedial Activities at SWMU-14 Q-50 Satellite Accumulation Area,
Naval Station Norfolk, Norfolk, Virginia

I have read and approved this Site Specific Health and Safety Plan for the Remedial Activities at SWMU-14 Q -50 Satellite Accumulation Area, Naval Station Norfolk, Norfolk, Virginia, with respect to project hazards, regulatory requirements, and Shaw Environmental, Inc. procedures.

May 28, 2008

David Mummert, CIH
Program Certified Industrial Hygienist
Shaw Environmental, Inc. (Shaw)

Date

May 28, 2008

Mark Pisarcik
Project Manager
Shaw Environmental, Inc. (Shaw)

Date

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Appendix A International Safety Cards & Material Safety Data Sheets
Appendix B Site-Specific Health and Safety Procedures
Appendix C Activity Hazard Analyses
Appendix D Directions to Health Resource Clinic and Hospital
Appendix E Health and Safety Plan Amendment Documentation Form
Appendix F Hurricane Preparedness Plan
Appendix G Accident Prevention Plan
Appendix H Safety Plan Acknowledgement
Appendix I OSHA 300 Log

List of Acronyms

AHA	Activity Hazard Analyses
BAC	Blood Alcohol Concentration
CIH	Certified Industrial Hygienist
CFR	Code of Federal Regulation
CO	Carbon Monoxide
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
FEAD	Facilities Engineering and Acquisitions Department
F/B	Flash/Bang
HSC	Health and Safety Coordinator
HSM	Program Health and Safety Manager
IDLH	Immediately Dangerous to Life and Health
LEL	Lower Explosive Limit
mg/m^3	Milligrams per cubic meter
Mph	Miles Per Hour
MSDS	Material Safety Data Sheet
NAS	Naval Air Station
NSN	Naval Station Norfolk
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
O_2	Oxygen
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbons
PEL	Permissible Exposure Level
PM	Project Manager

List of Acronyms *(continued)*

PPE	Personal Protection Equipment
ppm	Parts Per Million
Shaw	Shaw Environmental, Inc.
SS	Site Supervisor
SSO	Site Safety Officer
SSHSP	Site-Specific Safety and Health Plan
SVOC	Semi-Volatile Organic Compound
SZ	Support Zone
TLV	Threshold Limit Value
TWA	Time-Weight Average
UST	Underground Storage Tank
UV	Ultraviolet
VC	Vinyl Chloride
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 OBJECTIVE

The objective of this plan is to provide a mechanism for establishing safe working conditions at the site. The safety organization, procedures, and protective equipment have been established based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of accident or injury.

1.2 POLICY STATEMENT

The policy of Shaw is to provide a safe and healthful work environment for all employees. Shaw 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, it is believed all accidents and injuries are preventable. Shaw will take every reasonable step to reduce the possibility of injury, illness, or accident.

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

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 SSHSP complies with applicable Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), and Shaw 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, National Institute for Occupational Safety and Health (NIOSH), OSHA, U.S. Coast Guard (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.
- USACE Safety and Heath Requirements Manual EM 385-1-1.
- Shaw Health and Safety Procedures HS001 through HS999 (current).

1.4 DISCLAIMER

The enclosed Site Specific Health and Safety Plan has been designed for the methods presently contemplated by Shaw Environmental, Inc. (Shaw) for execution of the proposed work. Therefore, the Site Specific Health and Safety Plan may not be appropriate if the work is not performed by or using the methods presently contemplated by Shaw and/or Shaw, or if the scope of work is modified. Each company or contractor is responsible for the safety and health of their personnel, for their actions, and for the work they perform. It is highly recommended that each company or contractor working at Norfolk Naval Station, SWMU-14 Q-50 Satellite Accumulation Area perform their work under the supervision of their internal health and safety professionals.

2.0 SITE HISTORY/SCOPE OF WORK

2.1 BACKGROUND

SWMU-14, Q-50 Satellite Accumulation Area, is a 13.2 acre site, located in the northeast corner of Naval Station Norfolk (NSN), adjacent to Willoughy Bay. The site consists of a concrete storage pad surrounded by a grass covered field. The pad served as a less than 90 day hazardous waste accumulation area, where waste generated through various waste streams were processed (sampled, identified, labeled, and packaged) before being shipped for eventual disposal.

In addition to the accumulation area, the peninsula at NSN (formally Sewell's Point) is a man-made landmass formed from two distinct periods of filling activities. The first landfill activities began in the early 1950s, when the channels were dredged to allow for construction of the northern most series of piers at the site. The resulting dredged material was used to create much of the land at Sewell' Point. The second period of filling occurred between 1974 and 1978, when the eastern portion of the site was formed from the disposal of construction debris. This landfill was later designated as Site 9, Q-Area Landfill, and reportedly used for the disposal of nonhazardous construction debris. Site 9 was originally designated as No Further Action. However, because Site 9 and SWMU-14 are co-located, Site 9 soil and groundwater were evaluated to determine the potential impact of contamination from SWMU-14. Based on this, it was determined that due to the presence of dredge, soil and construction debris, the soil had been impacted by volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals and dioxins/furans.

2.2 SCOPE OF WORK

The scope of the action to be initiated at the SWMU-14 site is basically to install an asphalt cover in the designated location to serve as a barrier to potentially contaminated media.

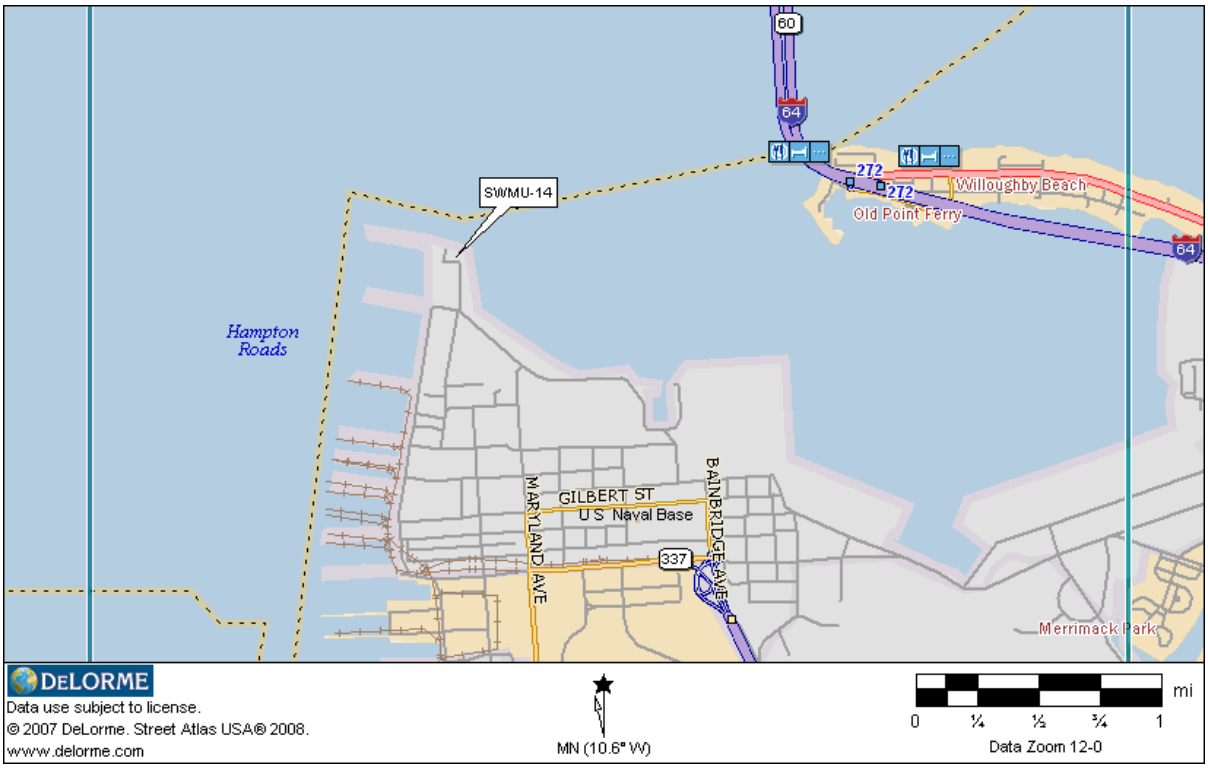
The principle tasks to be conducted on this phase of work are listed below:

- Mobilization
- Construction Facilities Setup
- Clearing and Grading Site
- Demolition and Removal of Existing Concrete Pad

- Installation of Erosion and Sediment Controls
- Installation of Asphalt Cap
- Installation of Subgrade Storm Water Drainage Piping
- Construction of Bioretention Areas
- Installation of Parking Lot Lighting
- Equipment Decontamination
- Site Restoration
- Demobilization

All site activities have been analyzed for potential hazards for which control measures are provided in Appendix C, Activity Hazard Analyses.

2.1 Site Location Map



3.0 KEY PERSONNEL AND MANAGEMENT

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

3.1 PROJECT SAFETY RESPONSIBILITES

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 SSHSP requirements. The PM will coordinate with the SS, and the SSO to assure that the work is completed in a manner consistent with the SSHSP. The SS is responsible for field implementation of the SSHSP. 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 PM, CIH, SS and SSO are authorized to administer this SSHSP. The PM, HSM, CIH, SS and SSO are authorized to stop work when an imminent health or safety risk exists. The PM and CIH are responsible for reviewing the SSHSP and ensuring that the SSHSP is complete and accurate. The HSM and CIH will also provide 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 Shaw	Mark Pisarcik (757) 544-2085 (cellular) (757) 640-6936 (office)
Site Supervisor Shaw	Rich Kilmer (716) 940-1439(cellular)
Site Safety Officer Shaw	Rodney Alexander (904) 422-3695(cellular)
Facilities Engineering and Acquisition Department (FEAD) Navy	Sheldon Johnson (757) 322-4186 (office)
Program Health and Safety Manager Shaw	Kym Edelman, ASP (757) 640-6950 (office) (757) 435-5384 (cellular)

Program Certified Industrial Hygienist Shaw	David Mummert, CIH (419) 425-6129 (office) (419) 348-1544 (cellular)

4.0 ACTIVITY HAZARDS

This section outlines the potential chemical and physical hazards to which workers may be exposed during concrete coring and soil sampling activities. Table 4.1 lists known contaminant at the site. Chemicals which may be brought to the site, for which a Materials Safety Data Sheet (MSDS) is necessary, are located in Attachment C.

4.1 CHEMICAL HAZARDS

Based on the sampling results contained in the document ***Engineering Evaluation/Cost Analysis (EE/CA) SWMU 14 (Q-50 Satellite Accumulation Area)*** prepared by the CLEAN Contractor, undated document, the following surface and sub-surface soil contaminants may be encountered during work on Q-50 area: volatile organics, semi-volatile organics such as coal tar pitch volatiles, pesticides such as DDT and its breakdown products, PCBs, and metals. These materials are typically in low concentrations with many of the compounds below detectable levels and others slightly above detectable limits according to the analytical reports. The overall concentrations were significantly low to allow the customer to determine that the materials may be covered with an asphalt parking lot. The chemical hazard at this site should be contrasted to an area sufficiently contaminated to require excavation and off-site disposal.

A summary of the site contaminants is provided in **Table 4.1**.

Table 4.1
Primary Site Contaminants

CHEMICAL	Maximum Soil Concentration (mg/kg)	EXPOSURE ROUTES	EXPOSURE LIMIT	HEALTH HAZARDS/ PHYSICAL HAZARDS
Volatile Organic Compounds	Below detectable limits	inhalation, ingestion, skin and/or eye contact	Varies on specific compound	• Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis • Oxidizers, acids
SVOCs (Coal Tar Pitch Volatiles)	1.7	inhalation, skin and/or eye contact	0.2 mg/m^3	• Dermatitis, bronchitis, [potential occupational carcinogen] • Strong oxidizers
DDD, DDE, DDT	0.0042	inhalation, skin absorption, ingestion, skin and/or eye contact	1 mg/m^3	• Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]

CHEMICAL	Maximum Soil Concentration (mg/kg)	EXPOSURE ROUTES	EXPOSURE LIMIT	HEALTH HAZARDS/ PHYSICAL HAZARDS
Dieldrin	Below detectable limits	inhalation, skin absorption, ingestion, skin and/or eye contact	0.25 mg/m^3	• Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage • Strong oxidizers, active metals such as sodium, strong acids, phenols
PCBs (Aroclor 1248, 1254, 1260)	0.012 (PCB 1260)	inhalation, skin absorption, ingestion, skin and/or eye contact	0.5 mg/m^3	• Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen] • Strong oxidizers
Aluminum	13.8	inhalation, skin and/or eye contact	10 mg/m^3	• Irritation eyes, skin, respiratory system • Strong oxidizers & acids, halogenated hydrocarbons [Note: Corrodes in contact with acids & other metals. Ignition may occur if powders are mixed with halogens, carbon disulfide, or methyl chloride.]
Antimony	0.001	contact, inhalation, ingestion	0.5 mg/m3	• Irritation of eyes, skin, nose, throat, mouth, coughing, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps, insomnia, anorexia, unable to smell properly. • Avoid strong oxidizers, acids, halogenated acids..
Arsenic	0.020	absorption, contact, inhalation, ingestion	PEL: 0.01 mg/m3 TLV: 0.01 mg/m3	• Ulceration of the nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritant, hyperpigmentation of skin, carc. • Reacts with strong oxidizers, bromine azide.
Barium	0.056	inhalation, ingestion, skin and/or eye contact	0.5 mg/m^3	• Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia • Acids, oxidizers, aluminum-magnesium alloys, (barium dioxide + zinc) [Note: Contact with combustible material may cause fire.]
Beryllium	0.096	inhalation, skin and/or eye contact	0.002 mg/m^3	• Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen] • Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium

CHEMICAL	Maximum Soil Concentration (mg/kg)	EXPOSURE ROUTES	EXPOSURE LIMIT	HEALTH HAZARDS/ PHYSICAL HAZARDS
Cadmium	0.002	inhalation, ingestion	0.002 mg/m^3	• Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen] • Strong oxidizers; elemental sulfur, selenium & tellurium
Chromium	0.047	inhalation, ingestion, skin and/or eye contact	0.5 mg/m^3	• Irritation eyes, skin; lung fibrosis (histologic) • Strong oxidizers (such as hydrogen peroxide), alkalis
Copper	0.067	contact, inhalation, ingestion	1.0 mg/m3	• Irritation of eyes, nose and pharynx, nasal perforation, metallic taste, dermatitis, • Avoid strong oxidizers, alkalis, sodium azide, acetylene.
Lead	2.2	inhalation, ingestion, skin and/or eye contact	0.050 mg/m^3	• Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension • Strong oxidizers, hydrogen peroxide, acids
Iron	41	contact, inhalation, ingestion	TLV: 1.0 mg/m3	• Irritation eyes, skin, and mucous membrane, abdominal pain, diarrhea, vomiting, possible liver damage.
Manganese	8.6	inhalation, ingestion	0.2 mg/m^3	• Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage • Oxidizers [Note: Will react with water or steam to produce hydrogen.]
Nickel	0.028	inhalation, ingestion, skin and/or eye contact	0.1 mg/m^3	• Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen] • Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate

CHEMICAL	Maximum Soil Concentration (mg/kg)	EXPOSURE ROUTES	EXPOSURE LIMIT	HEALTH HAZARDS/ PHYSICAL HAZARDS
Silver	0.008	inhalation, ingestion, skin and/or eye contact	0.01 mg/m^3	• Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance • Acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid
Vanadium	0.079	inhalation, ingestion, skin and/or eye contact	0.05 mg/m^3	• Irritation eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, dyspnea (breathing difficulty) • Lithium, chlorine trifluoride
Zinc	0.28	Skin, eye, inhalation, ingestion	PEL: 15 mg/m3 total dust TLV: 2.0 mg/m3	• Metal fume fever, chills, muscle aches, nausea, fever, dry throat, cough, weak, lassitude, metallic taste, headache, blurred vision, low back pain vomiting, fatigue, malaise, tight chest, dyspnea, rales, decreased pulmonary function. • Avoid chlorinated water and rubber.
Silica	Possible during concrete demolition	Inhalation	0.0025 mg/m^3 TLV	• Irritation of eyes nose and throat. Chronic exposure leads to silicosis of the lungs. • Inert compound. Avoid creating dust.

The following general symptoms may indicate exposure to a hazardous chemical. Personnel will be removed from the work site and provided immediate medical attention if the following symptoms occur:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Chest pains and coughing
- Rashes or burns.

4.2 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 personnel and subcontractors. Hazard communication will include:

4.2.1 Container Labeling

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

4.2.2 Material Safety Data Sheets (MSDS)

There will be an MSDS located on site for all site contaminants and each hazardous chemical known to be used on site. MSDS's are located in Appendix A.

4.2.3 Employee Information and Training

Training employees on chemical hazards is accomplished through an ongoing corporate training program. All site employees shall maintain their HAZWOPER training, in accordance with 29 CFR 1910.120. Additionally, chemical hazards are communicated to employees through daily safety meetings held at Shaw field projects and by an initial site orientation program.

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

- An in-depth review of the soil and surface contaminants of concern identified and listed in Section 4.1.
- 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 MSDS's for hazardous substances found on Shaw sites.
- Emergency spill procedures.
- Proper storage and labeling.

Before any new hazardous chemical is introduced on site, each Shaw and related subcontractor employee will be given information in the same manner as during the safety class. The site Superintendent 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.

4.3 PHYSICAL HAZARDS

To minimize physical hazards, Shaw has developed standard safety protocols that will be followed at all times. Activity Hazard Analyses, located in Appendix C, have been developed for each principal activity and identify all major hazards to which employees may be exposed.

The SS and SSO 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. Hard hats, safety glasses and steel-toe safety boots are required in all areas of the site. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings**.** Failure to follow safety protocols will result in removal of an employee from the site and appropriate disciplinary actions.

4.4 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants may pose a hazard when performing outdoor tasks. The SS will take necessary actions to alleviate these hazards should they arise.

4.4.1 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 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 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 judgment of the SSO is necessary to assure a fully protective plan to prevent heat stress disorders.
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Table 4.2
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 HSC 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) or 38 ^{o}C (degrees ^{o}C Celsius). 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 ^{o}F 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.

4.4.2 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 A-weighted decimal (dBA) (Time Weighted Average [TWA]) as well as personnel working around heavy equipment. The HSC will determine the need and appropriate testing procedures (i.e., sound level meter and/or dosimeter) for noise measurement in accordance with Shaw Health and Safety procedure HS402 Hearing Conservation Program.

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 are working or visitors are present in that location. A supply of earplugs 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 EPA. The calculation for a hearing protection device's effectiveness is: noise reading dBA – (NRR – 7dB) < 90 dBA.

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 HSM

4.4.3 Biological Hazards

Poison Ivy (RHUS RADICANS). 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., IvyBlock®) 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. A one percent 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.

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.

Nor

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.

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.

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.

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 Superintendent 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.

West Nile Virus and West Nile Encephalitis West Nile Virus/West Nile Encephalitis is rapidly becoming a health concern in the United States. West Nile Virus was first identified in the U.S. in the New York area in 1999 and is closely related to the St. Louis Encephalitis Virus, which is routinely found in the United States.

"Encephalitis" means an inflammation of the brain and it can be caused by viral and bacterial infections. West Nile Encephalitis can be a serious or even fatal illness although this is rare in humans. This illness develops in approximately one of every 150 infections and is generally confined to older and physically compromised individuals.

West Nile Encephalitis is a viral infection of the brain transmitted through the bite of a mosquito, which has previously fed on birds and/or horses that were infected with West Nile Virus. Dead birds in an area may mean that West Nile Virus is circulating between the birds and the mosquitoes in that area. West Nile Virus is not transmitted from one person to another. Human illness from West Nile Virus is rare, even in areas where the virus has been reported.

Symptoms of Exposure Most people who become infected with West Nile Virus will have either no symptoms or only mild ones. Symptoms of West Nile Encephalitis include high fever, headache, confusion, muscle aches and weakness, seizures, or paralysis. At its most serious, the infection can result in coma, permanent neurological damage, and death. Symptoms usually occur five to 15 days following the bite of an infected mosquito. Because West Nile Encephalitis is a viral infection, antibiotics are not effective and there is no specific treatment available other than general support therapy.

Protective Measures at Projects There is no vaccine to protect humans against West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- Review the hazards of West Nile Virus periodically in morning safety meetings.
- Increase protective measures when working at dawn, dusk, and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, e.g., heavy long sleeve work shirts and heavy jeans may be indicated. Also, the risk or threat of mosquito bites is reduced for those activities that require the use of disposable coveralls.
- For activities where only Level D Personal Protective Equipment (PPE) is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- Use an insect repellent containing approximately 25% DEET (N, N-diethyl-meta-toluamide). DEET in concentrations greater than 25% provides no additional protection but repel insects longer. However, at some point there is no direct correlation between

concentration and repellency. For example, 50% DEET provides about four hours of protection against mosquitoes, but increasing the concentration to 100% provides only one additional hour of protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent re-application is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.

- After returning from outdoor field activities, wash treated skin with soap and water.
- Personnel should report flu-like symptoms to the SSHO.

DEET is safe for pregnant and lactating women and is generally safe for children. You should avoid applying it to open wounds and irritated skin as it may further irritate the skin or cause discomfort.

Sweating, perspiration and getting wet may wash away the repellent and may require that DEET containing repellent be re-applied.

To remove the breeding places on a project, the following precautions will be followed as practical:

- Cut tall grass and weeds
- Drain accumulated water in such items as drums, buckets, pools and plastic containers
- Repair holes in door and window screens
- Eliminate stagnate water puddles as practical
- Limit outdoor activities at dawn, dusk and early evening, when mosquitoes are most active, as practical

4.4.4 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 SSO will be proactive in monitoring conditions that may produce thunderstorms and lightning. A daily and weekly weather forecast will be tracked and communicated to site personnel. When signs of impending storms, i.e., increasing wind,

darkening skies, or lightning 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 an 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 employees involved in the operation and use of Shaw and/or leased or rented vehicles will comply with the Shaw Health and Safety procedures HS800 Motor Vehicle Operation: General Requirements and HS810 Commercial Vehicle Operation and Maintenance. Shaw requires employees to use seat belts at all times when traveling in Shaw owned or

leased/rented vehicles. The SS will develop a parking area plan, including backing vehicles into parking spaces, using spotters for backing vehicles and policy mandated vehicle inspections.

Shaw 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 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 immediately.

Shaw 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, a driver with blood alcohol concentration (BAC) over 0.04 percent 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 miles per hour (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 to be transported inside the passenger compartment
- No vehicle is left running when unattended
- 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

Forklifts, drill rigs, loaders 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 MANUAL MATERIAL LIFTING

Many different types of objects may be handled manually during site operations. Care should be taken when lifting and handling heavy or bulky items because they are the cause of many back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered. No individual employee is permitted to lift any object that weighs more than 60 pounds. Multiple employees or the use of mechanical lifting devices are required for objects over the 60-pound limit.
- The anticipated path to be taken by the lifter should be inspected for the presence of slip, trip, and fall hazards.
- The feet shall be placed far enough apart for good balance and stability (typically shoulder width). THE FOOTING SHALL BE SOLID.
- The worker shall get as close to the load as possible. The legs shall be bent at the knees.
- The back shall be kept as straight as possible and abdominal muscles should be tightened.
- To lift the object, the legs are straightened from their bending position.
- A worker shall never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered.

When two or more workers are required to handle the same object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, shall face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines shall be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves shall be used if necessary.
- The hands and object shall be free of oil, grease, and water that might prevent a firm grip, and the fingers shall be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.
- The item shall be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

4.7 ACTIVITY HAZARD ANALYSES

Appendix C contains Activity Hazard Analyses (AHA) for primary site tasks. They contain detailed information on physical and chemical hazards, and provide control measures for these hazards. The AHA's will be field checked by the SS and SSO on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew. In addition to the AHAs, a Job Safety Analysis (JSA) must be completed daily in accordance with Shaw Health and Safety Procedure HS045. (See Appendix B)

5.0 WORK AND SUPPORT AREAS

To prevent migration of contamination debris 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.

5.1 SUPPORT ZONE (SZ)

The uncontaminated SZ, or clean zone, will be located in an area outside the EZ and CRZ and within the geographic perimeters of the site. The area is used for material staging, vehicle parking, office facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the EZ. All personnel arriving in the SZ will, upon arrival, report to the SSO and sign the site visitor log.

5.2 CONTAMINATION REDUCTION ZONE (CRZ)

Personnel and equipment decontamination will be performed in the CRZ that is adjacent to the EZ. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination and for the purpose of accountability. Personal protective outer garments and respiratory protection will be removed in the CRZ and properly labeled. All water generated from equipment and personal decontamination will be contained on site and disposed of in an appropriate manner.

5.3 EXCLUSION ZONE (EZ)

The EZ will be the area around the areas designated for grading, capping and associated activities. These areas have the highest potential for exposure to contamination by contact, ingestion, or inhalation. All employees will use proper PPE when working in these areas. The location of the EZ will be identified by fencing or other appropriate means primarily around the excavation areas and the stockpiles. A daily entry log records the time of entry and exit from the EZ for each person.

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 SSHSP.

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/CRZ's.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and 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.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SS and SSO, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

6.0 PROTECTIVE EQUIPMENT

This section specifies the levels of personal protective equipment (PPE), which is required for each principle activity performed at this site. All site personnel must be trained in the use of all PPE utilized. The PPE procedures outlined in Shaw Health and Safety procedures HS600 Personal Protective Equipment and HS601 Respiratory Protection Program will be applied to project activities.

6.1 ANTICIPATED PROTECTION LEVELS

The following protection levels have been established for the site work activities.

Table 6.1
Anticipated Protection Levels

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Mobilization; Construction Facilities Set-up; Site Restoration; Demobilization	Level 'D'	Not anticipated	Leather Work Gloves. Some activities may require Tyvek® coveralls to prevent insect bites/contact with poisonous plants	None	Hard-hat, steel-toe work boots, hearing protection >85 dBA, and leather-work gloves.
Clearing and Grading	Level D	Not Anticipated	Leather-work gloves; Tyvex Coveralls, inner latex gloves to prevent insect bites/contact with poisonous plants or general cleanliness	None	Hard hat, steel toe work boots, safety glasses, and hearing protection >85 dBA.
Demolition of concrete pad	Level 'D'	Not anticipated	Tyvek® coveralls to prevent insect bites/contact with poisonous plants;	None	Hard-hat, steel-toe work boots and hearing protection >85 dBA. Goggles/face shield when in there is a potential for rebounding materials
Installation of erosion and sediment controls; subgrade storm water drainage piping; and construction of bioretention areas	Level 'D'	Modified Level 'D' if direct contact with soil is required during drainage pipe installation	Leather-work gloves; Tyvex Coveralls, inner latex gloves to prevent insect bites/contact with poisonous plants or general cleanliness	None	Hard-hat, steel-toe work boots and hearing protection >85 dBA. Goggles/face shield when in there is a potential for splash hazards

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Installation of parking lot lighting	Level 'D'	None	Clothing consistent with good electrical practices	None	Hard-hat, steel-toe work boots and hearing protection >85 dBA. Full protection if operating in manlifts.
Equipment decon	Modified Level 'D'	None	Initial/Upgrade: Poly coat Tyvek® coveralls or rain suit, inner latex sample gloves, outer nitrile gloves and boot covers for all activities involving intrusive work;	None	Hard-hat, steel-toe work boots and hearing protection >85 dBA. Goggles/face shield when in there is a potential for splash hazards
General Support Zone activities	Level 'D'	None	None	None	Hard-hat, steel-toe boots, safety glasses and hearing protection >85dBA

6.2 PROTECTION LEVELS 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 the weather
- Tyvek® coverall, as necessary to protect from dust/debris
- Leather work gloves
- Rubber gloves when working with wet concrete
- Cut resistant gloves when handling sharp objects
- Reflective vests for ground personnel working around heavy equipment or roadways
- Hearing protection in areas >85 dBA

6.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Poly-coated Tyvek® coverall or PVC rain suit (when handling wet materials or engaged in equipment decon activities)
- Latex over-boots
- Inner latex sample gloves
- Outer leather gloves (or rubber gloves when working with concrete)
- Hearing protection in areas >85 dBA
- Full-face shield when splash or flying debris hazards are present
- Metatarsal and shin guard for pressure sprayer operations

6.3 SITE- SPECIFIC PERSONAL PROTECTIVE EQUIPMENT (PPE)

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 and SSO 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 SSO, in consultation with the SSO and the HSM, will direct changes in PPE based on changing conditions. The site-specific SSHSP will serve as written certification that the workplace was evaluated concerning PPE requirements.

7.0 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 DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted in the EZ do not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

7.1.1 Modified Level D Decontamination

1. Go to end of EZ
2. Remove and discard latex booties
3. Remove outer gloves and discard
4. Remove protective suit
5. Remove inner sample gloves and discard
6. Wash face and hands.

7.1.2 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 based on the degree of injury.

7.1.3 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 SS and/or SSO.

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.

7.4 SUSPECTED CONTAMINATION

Any employee suspected of sustaining skin contact with chemical materials will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided based on the degree of injury.

8.0 AIR MONITORING

Air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. The site contaminants are identified in Section 4.0 of the SSHSP. Calculations conducted relating known levels of surface contaminants to potential for exposures above regulatory limits were utilized to determine action levels defined in Table 8.1. Additionally, the same calculations indicate the need to utilize Level 'C' PPE during the removal of all bricks and debris, or any activities creating dust. Action levels for other activities are indicated in Table 8.1.

8.1 WORK AREA AIR MONITORING

Work area air monitoring for soil sampling in SWM-14 Q-50 Area will be by direct reading methods. Air monitoring will be performed during the grading activities and when demolishing the existing concrete pad..

A personal Data RAM (pDR) will be used to monitor for airborne particulate. A photoionization detector (PID) will be used to monitor for organic vapors or evaluate odors if any during excavation. Air monitoring results will be used to determine the effectiveness and/or need for dust control methods and to trigger action levels as specified in Table 8-1.

Table 8.1
Direct Reading Air Monitoring Requirements

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
Data RAM	Work area	Continuously during all activities in exclusion area during grading activities and until the exposed surface is covered with gravel or other material	$\geq$0.23 -5.0 mg/m^{3*} >5.00 mg/m^{3*}	Level C Stop work. Evaluate dust control measures. Contact the Health and Safety Manager.
Data RAM	Concrete pad perimeter	Continuously during demolition operations	Any above background	Increase water wetting and slow work. Contact the Health and Safety Manager.
PID	Work area	Periodically or when odors are noticed	Any measurements above background	Stop work and re-evaluate. Contact Health and Safety Manager

*Sustained levels above background for 5 minutes in the breathing zone.

8.2 INSTRUMENTATION

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

8.2.1 Real Time Aerosol Monitor (Model pDR) Data RAM

8.2.1.1 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

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

8.2.1.2 Calibration Methods/Frequencies

There is no calibration method or procedure for calibrating the mini-ram monitor. However, it is recommended that the Data RAM monitor be re-zeroed once daily.

8.2.1.3 Preventative Maintenance

Maintenance of the Data RAM consists of replacement battery replacement and cleaning of the optical detection assembly.

8.3 PHOTOIONIZATION DETECTOR (PID)

8.3.1 Principle of Operation

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

8.3.2 Photoionization Detector (PID)

8.3.2.1 Type and Operational Aspects

PID Photvac 20/20 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 (10.6, 9.5, 11.7 eV) 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 an 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.

8.3.2.2 Calibration Method/Frequencies

The PID Photovac 20/20 is designed for trace gas analysis in ambient air and is calibrated at HNU with certified standards of benzene, vinyl chloride, and isobutylene. Other optional calibrations are available (e.g., ammonia, ethylene oxide, H_2S, etc.).

Shaw 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 is 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.

8.3.2.3 Preventative Maintenance

Maintenance of the PID Photovac 20/20 consists of cleaning the lamp and ion chamber, and replacement of the lamp or other component parts or sub-assemblies.

8.4 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a notebook. Data will include instrument used, wind direction, work process, etc. The Program CIH will periodically review this data.

8.5 CALIBRATION REQUIRMENTS

The Data RAM will be zeroed before use and the PID meter will be calibrated daily. A separate log will be kept by the SSO detailing date, time, span gas, or other standard, and name of person performing the calibration.

8.6 AIR MONITORING RESULTS

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

9.0 EMERGENCY RESPONSE

9.1 PRE-EMERGENCY PLANNING

Prior to engaging in remediation activities at the site, Shaw 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):

Fire/Explosion	• The potential for human injury exists. • Toxic fumes or vapors are released. • The fire could spread on-site or off-site and possibly ignite other flammable materials or cause heat-induced explosions. • The use of water and/or chemical fire suppressants could result in contaminated run-off.
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. • Hurricanes
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.

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 Site Superintendent 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) in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. 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 air horns.

9.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the Site Superintendent and the Site Safety Officer, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, daily JSAs and AHAs) 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 • Excessive noise
Mechanical Hazards	• Pinch points • Vehicle traffic • Stored energy
Environmental Hazards	• Electrical Storms • High winds • Heavy Rain/Snow • Temperature Extremes (Heat/Cold Stress) • Poisonous Plants/Animals

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 meeting
- Task-specific training prior to commencement of activity
- PPE selection/use
- Following all Shaw standard operating procedures

Table 9.1

Emergency Phone Numbers

Local Agencies –Norfolk, VA	911
Fire Department/Rescue (Navy)	444-3333
Police	911
Hospital - DePaul Medical Center 6200 Granby Street Norfolk, VA	(757) 889-5111
Health Resources Clinic **Family Medical Centers** **816 Independence Blvd.** **Virginia Beach, VA**	(757) 363-6800
Regional Poison Control Center	(800) 552-6337
State Agencies	
Virginia Department of Environmental Quality	(757) 367-0080
Federal Agencies	
Agency for Toxic Substances and Disease Registry	(215) 597-9800
EPA Region Branch Response Center	(404) 347-3931
National Response Center	(800) 424-8802
LANTDIV Program	
NTR- Ms. Winoma Johnson	757-444-3418 (office)
FEAD – Sheldon Johnson	757- 322-4186 (office)
COR –	TBD (office) TBD (cell)
Shaw Personnel:	
Program Manager – Jim Dunn	(757) 640--6932 (office)
Project Manager – Mark Pisarcik	(757) 640--6936 (office)
Site Supervisor- Rich Kilmer	(716) 940-1439 (cellular)
Site Safety Officer- Rodney Alexander	(904) 422-3695(cellular)
Health and Safety Manager– Kym Edelman	(757) 435-5384 (cellular)
Program CIH – Dave Mummert	(419) 425-6129(office)
Shaw Corporation (24 hour)	866-299-3445
Additional Phone #'s in Section 3 this HASP	

9.3 PERSONNEL ROLES, LINES OF AUTHORITY, AND 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 Site Superintendent. 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.

9.3.1 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 will follow procedures as directed by the Fire Department, LEPC, State and Federal agencies as required. Shaw will defer to the local Fire Department Chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

9.3.2 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 the FEAD. The FEAD will contact the local Emergency Response Teams if their help is necessary to control the incident. Table 9.1 provides telephone numbers for emergency assistance.

- Direct on-site personnel to control the incident until, if necessary, 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. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.

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

- Notify Shaw Project Manager

- Notify FEAD

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

If the incident may threaten human health or the environment outside of the site, the Emergency Coordinator should immediately determine whether evacuation of area outside of the site maybe necessary and, if so, notify the FEAD. The FEAD will contact the local Police Department and the Office of Emergency Management.

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, contaminated soil or surface water, 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.

9.3.3 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. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the Emergency Coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The Emergency Coordinator, or his designee, will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 9.1.

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
- Medical emergency
- Hazardous weather.

In general, evacuation will be made to the main entrance to the Shaw site, 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 entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the Emergency Coordinator.

9.3.4 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.

9.3.5 Evacuation Signals and Routes

Two-way radio communication and an air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. The crew Superintendent will have a two-way radio. Only the Emergency Coordinator will initiate total site evacuation, however, in his absence, decision to preserve the health and safety of employees will take precedence.

9.3.6 Evacuation Procedures

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

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.

- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the Emergency Coordinator.

- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.

- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.

- Upon completion of the head count, the crew leader will provide the information to the Emergency Coordinator.

- Contract personnel and visitors will also be accounted for.

- The names of emergency response team members involved will be reported to the emergency spill control coordinator.

- The Emergency Coordinator, or designee, will make a final tally of persons. No attempt to find persons not accounted for will involve endangering lives of Shaw or other employees by re-entry into emergency areas.

In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the Site Superintendent.

- Personnel will be assigned by the Emergency Coordinator to be available to direct and brief emergency responders.

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

- Drills will be held annually, at a minimum, to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

9.4 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 (Page 9-4) provide a quick reference guide to follow in the event of a major spill.

9.4.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site Emergency Coordinator.

On-site Emergency Coordinator 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, vapor or smoke release is heading.
- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site Emergency Coordinator to assess the magnitude and potential seriousness of the spill or release.

9.4.2 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.

- Construction of a temporary containment berms utilizing on-site clay absorbent earth

- Digging a sump, installing a polyethylene liner

- 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 FEAD 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. Such items may include, but are not limited to:

- Shovel, rake
- Sorbent materials
- Personal safety equipment
- Steel drums
- Miscellaneous hand tools.

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), Shaw practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA. Shaw also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Clean up personnel will take the following measures:

1. Make sure all unnecessary persons are removed from the hazard area.

2. Put on protective clothing and equipment.

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

4. Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.

5. If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.

6. Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.

7. Spray the spill area with foam, if available, if volatile emissions may occur.

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

9. For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

9.4.3 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.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash
- Emergency signal horn.

9.4.4 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.

The materials listed below may be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the support zone. Small amounts will be placed on pallets and located in the active work areas.

- Appropriate solvents (e.g., CITRIKLEEN, for decontamination of structures or equipment).

- Sand or clay to solidify/absorb liquid spills.

9.4.5 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.

9.4.6 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 Superintendent will be summoned.

The work crew Superintendent will immediately make radio contact with the on-site Emergency Coordinator to alert him of a medical emergency situation. The Superintendent 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 Superintendent 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 EZ will be evacuated by Shaw personnel 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.

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 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, 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.

An accident/injury/illness report will be completely and properly filled out and submitted to the Program Health and Safety /Project CIH, in accordance with Shaw reporting procedures.

A list of emergency telephone numbers is given in Table 9.1.

Non Life-Threatening Incident. All injuries, no matter how small, will be reported to the SS and SSO. If it is determined that no threat to life is present, the Site Superintendent will direct the injured person through decontamination procedures 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.

9.4.7 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
- Notify Shaw PM
- Notify FEAD

9.4.8 Fire Contingency Measures

Shaw 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 and throughout the exclusion and contamination reduction zones.

- Fire extinguishers will be located in all Shaw site dedicated vehicles and 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.

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

- Anyone who sees a fire will notify his or her Superintendent 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.

9.5 HAZARDOUS WEATHER CONTINGENCY MEASURES

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

- Lightning
- Heavy Rains
- High Winds

9.5.1 Response

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

- Personnel will be moved to safe refuge. 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.

9.5.2 Notification

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

- Shaw employees and subcontractors
- Notify Shaw PM
- Notify FEAD

10.0 TRAINING REQUIRMENTS

As a requirement for work at this site, in any hazardous waste work area, all Shaw 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 Superintendent. Supervisory personnel shall have received an additional 8-hour training in handling hazardous waste operations.

HAZWOPER training is required for personnel working within the exclusion zone until the initial grading is completed and gravel cover established. With the contaminated area covered, personnel will be able to work after completing site specific training.

All personnel entering the exclusion zone 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 SWMU-14, Q-50 Satellite Accumulation Area will include potential site contaminants, Hazard Communication, as per 29 CFR 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 or SSO before any site work activities begin.

Outlines of the orientation for Shaw personnel and subcontract personnel and visitors are presented below:

Shaw/SUBCONTRACTORS	**VISITOR ORIENTATION**
• SSHSP sign off • Sign in/out procedures • Site background • Chain of command • Rules and regulations • Hours of work • Absences • Equipment • Emergency Information • Emergency signal • Gathering point • Responsibilities/roles	• SSHSP signoff • Review of Site map • Work Zones in progress • Hazard Communication • Emergency plan/signals • Training/medical requirements • Zones/areas open to visitors

Shaw/SUBCONTRACTORS	VISITOR ORIENTATION
• Emergency phone numbers • Work Zones • Contaminants, MSDS's [Hazard Communication Program] • AHA's (Activity Hazard Analyses) • Forms, site-specific Incident Reporting	

11.0 MEDICAL SURVEILLANCE PROGRAM

All Shaw 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's worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist and Shaw's occupational health physician. Other medical consultants are retained when additional expertise is required.

All field personnel performing activities in a designated EZ or CRZ prior to grading and the establishment of a gravel cover shall, within the past 12 months, have completed a comprehensive medical examination that meets the requirements of OSHA regulations 29 CFR 1910.120 and 29 CFR 1926.65. The annual medical includes the following elements:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count, with differential
- Liver enzyme profile
- Chest x-ray, once every 3 years, for non-asbestos workers
- Pulmonary function test
- Audiogram
- Electrocardiogram for persons older than 35 years of age, or if indicated during the physical examination
- Visual acuity
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

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

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

The Shaw 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 Following Health Resource Clinic will be used for all non life-threatening medical emergencies:

Health Resource Clinic
Family Medical Centers
816 Independence Blvd.
Virginia Beach, VA
(757) 363-6800

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

12.0 BLOOD-BORNE PATHOGEN EXPOSURE CONTROL PLAN

Blood-borne pathogens are microorganisms (i.e., bacteria, virus) sometimes present in blood and certain body fluids, which are capable of causing human disease or death. These pathogens can also be present on objects and surfaces that have had contact with infected blood or certain body fluids. Blood-borne pathogens are also capable of causing human disease or death to unprotected people who come into contact with infected blood or body fluids. Diseases caused by blood-borne pathogens include, but are not limited to, hepatitis A, hepatitis B, hepatitis C, malaria, acquired immunodeficiency syndrome (AIDS), and other sexually transmitted diseases. The most significant of these and of greatest concern are hepatitis B and AIDS.

Hepatitis B is a serious disease caused by hepatitis B virus (HBV), which attacks the liver. The virus can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu and may remain mild for an extended period of time. The HBV can remain infectious for up to 10-days, even in dried blood. Hepatitis B vaccine is available for all age groups to prevent hepatitis B virus infection.
Human immunodeficiency virus (HIV) is the virus that causes AIDS. People with HIV have what is called HIV infection. Some of these people will develop AIDS as a result of their HIV infection. Humans may be infected with HIV for many years without experiencing any symptoms. Upon development of AIDS, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, swelling of the lymph glands, and death. Presently, no cure exists for HIV or AIDS, and no vaccination is currently available.

A hazard exists for blood and other bodily fluids to be infected with dangerous, infectious pathogens. Employees could become infected if they are exposed to these blood-borne pathogens.

The purpose of this Blood-borne Pathogen Exposure Control Plan is to provide the information, procedures, and requirements necessary to prevent employee exposure to blood-borne pathogens.

12.1 REGULATORY, REQUIREMENT, AND POLICY COMPLIANCE

This Blood-borne Pathogen Exposure Control Plan has been prepared in compliance with:

- 29 CFR 1910.1030, Blood-borne Pathogens
- Safety and Health Requirements Manual, EM 385-1-1 (USACE, 2003), Section A.03.06
- Shaw HS 512, Handling of Blood or Other Potentially Infectious Material.

12.2 EXPOSURE DETERMINATION

Occupational Safety and Health Administration (OSHA) requires employers to perform an exposure determination, identifying employees who may incur occupational exposure to blood or other potentially infectious materials. The exposure determination is made without regard to the use of personal protective equipment. For exposure determination purposes, employees are considered to be exposed, even if they wear PPE.

Activities at this project do not present a high risk of employee exposure to blood or other body fluids. An exception to this would be under circumstances when personnel administer first aid care or CPR to injured workers and when personnel clean-up areas and equipment that may have come in contact with blood as a result of the incident. In these cases, there is reasonable potential for employee skin, eye, mucous membrane, or potential contact with blood or other bodily fluids.

OSHA requires a listing of job classifications with identification of tasks performed in which some employees <u>may</u> have potential for occupational exposure. This requirement is for employees to clearly understand the tasks that they may perform have a potential for occupational exposure to infectious materials. The job classifications and associated tasks with an exposure potential are as follows:

- Field Superintendent—Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.
- Site Safety Officer—Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.
- Laborer—Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.

These employees have potential for exposure to blood-borne pathogens when administering first aid or CPR and when performing post-accident clean-up operations due to:

- Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, rashes)
- Blood splashes to their eyes, nose, or mouth, or other mucous membranes
- Punctures through the skin with a contaminated sharp object (i.e., scissors)

Workers can reduce their risk of contacting blood-borne pathogens by implementing the recommended work practices (outlined in this plan) before, during, and after responding to emergency medical incidents primarily involving personal injuries.

12.3 SCHEDULE OF IMPLEMENTATION

The procedures in this Blood-borne Pathogen Exposure Control Plan are to be implemented immediately.

Implementation includes:

- Verifying personnel, who are available to voluntarily provide first aid care and CPR hold a valid training completion certificate from a reputable training provider (American Red Cross or American Heart Association).
- The SSO is responsible for verifying that an appropriate number of personnel have been trained in and hold valid certification to perform first aid and CPR.
- Verifying that personnel voluntarily providing first aid care, CPR, post-accident clean-up operations, and biohazard waste handling have received the specialized training meeting the requirements of 29 CFR 1910.1030, Blood-borne Pathogens; Safety and Health Requirements Manual, EM 385-1-1 (USACE, 2003), Section A.03.06; and Shaw HS512, Handling of Blood or Other Potentially Infectious Material. This training is required for applicable personnel prior to the commencement of work and at least annually thereafter. This training shall cover the following elements:
    - A copy of 29 CFR 1910.1030 and this procedure including an explanation of the contents
    - A general explanation of the epidemiology and symptoms of blood-borne diseases
    - An explanation of the modes of transmission of blood-borne pathogens

- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials
- An explanation of the use and limitations of practices that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment
- Information of the types, proper use, location, removal, handling, decontamination, and/or disposal of personal protective equipment
- An explanation of the basis for selection of personal protective equipment
- Information on the hepatitis B vaccine, including information on its efficacy, safety, and the benefits of being vaccinated
- Information on the appropriate actions to take and persons to contact in an emergency
- An explanation of the procedure to follow if an exposure incident occurs including the method of reporting the incident and the medical follow-up that will be made available
- Also information on the medical counseling that is provided for exposed individuals
- An explanation of required signs and labels

The SSO is responsible for verifying that this blood-borne pathogen training has occurred.

- Verifying that engineering controls are readily available at the project for use in an emergency. Engineering controls for this project include:
  - (Two) Red-bags for temporary storage of contaminated PPE and cleaning materials
  - (One) Appropriately labeled, 30-gallon hard-plastic container for the temporary storage of red-bagged waste
  - (One) Whisk-broom and dust pan for cleaning up contaminated broken glass
  - (One) Gallon container of Clorox household bleach
  - (One) Large utility sponge
  - (Two) Rolls paper towels
  - (One) Container of liquid disinfectant hand soap

- (Two) “Biohazard” warning labels
- (Ten) Individually packaged disinfectant towelettes
- (Two) CPR barriers

The SSO is responsible for verifying that this inventory of engineering controls is readily available at the project site for emergency use.

Verifying that the appropriate PPE for use in an emergency is readily available at the project site. Personal protective equipment is necessary to prevent employee exposures to infectious materials. The necessary PPE, which shall be maintained separately for use in an emergency include:

- (Two) Face-shields with ratcheting head-suspension
- (Two-pair) Safety glasses with clear lens
- (Box of 100) Disposable Nitrile examination gloves
- (Two pair) Poly-coated or Saran-coated disposable Tyvek® coveralls with attached hood
- (Two-pair) Vinyl or latex disposable boot covers

The SSO is responsible for verifying that the above inventory of PPE is readily available at the project site for emergency use.

12.4 WORK PRACTICE CONTROLS

Work practice controls reduce the likelihood of exposure by altering the manner in which a task is performed. The work practice controls outlined in this section are applicable to the administration of first aid and the subsequent clean-up operations.

Work practice controls shall be instituted whenever there is potential for employee contact with blood and bodily fluid. Situational examples where these controls are to be implemented include, but are not limited to:

- The voluntary administration of first aid care, such as application of bandages to minor or major cuts and abrasions of another person. This care may allow for contact with sores, wounds, broken skin, blood, or other bodily fluids.
- The voluntary administration of first aid care, such as providing CPR.
- Clean-up activities involving handling soiled articles (e.g., gauze, bandages, compresses, etc.) and the decontamination or disinfecting of surfaces and articles

that have contacted potentially infectious materials, such as blood or other bodily fluids.

- Prepare biohazard waste for temporary storage and subsequent disposal.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if the employee determines that the use of the PPE will further jeopardize his well being or that of the injured worker. This limited application must be carefully evaluated and considered by the employee. If this situation does occur, Shaw will investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

The following are specific work practice controls that shall be implemented in the above noted situations or whenever an employee determines that the implementation of these work practices is prudent or necessary:

- The appropriate PPE shall be donned prior to engaging in any activities that have the potential for employee contact with potentially infectious materials, such as blood or other bodily fluids.

- Hands and face will be washed as soon as possible after engaging in any activities that have the potential for employee contact with potentially infectious materials, such as blood or other bodily fluids. If wash facilities are not readily available, individually packaged disinfectant towelettes may be used in the interim.

- Eating, drinking, or smoking is not allowed in any work area where a potential exists for occupational exposure to blood borne pathogens.

- Open wounds or cuts shall be promptly bandaged.

- Work surfaces and areas shall be cleaned/disinfected immediately after being contacted by potentially infectious materials. A 10% bleach solution (one part bleach added to nine parts water) shall be applied and allowed to have a contact time of 15-minutes. Non-disposable articles, equipment, or materials contaminated with potentially infectious materials shall be similarly cleaned/disinfected prior to reuse.

- All bins, pails, cans, and similar receptacles intended for reuse, which have become contaminated with blood or other potentially infectious materials shall be cleaned/disinfected immediately after use.

- Broken glassware, which may be contaminated, shall not be picked up directly by hand. Broken glass shall be picked-up using mechanical means, such as by using a whiskbroom and dustpan.

- All personal protective equipment shall be immediately removed upon leaving the potentially contaminated work area, or as soon as possible if visibly contaminated. The contaminated PPE shall be placed in a labeled “red-bag” and then placed in the 30-gallon container for temporary storage and subsequent disposal.

- Any clothing that has contacted blood or other potentially infectious fluids shall be removed as soon as possible.

- Any clothing that has contacted blood or infectious fluids shall be placed in a labeled “red-bag” and then placed in the 30-gallon container for temporary storage and subsequent disposal.

12.4.1 Universal Precautions

Universal precautions is a method of infection control, which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be infectious for HIV, HBV, or other blood-borne pathogens. Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Universal precautions consist of the following practices:

- All workers shall routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when contact with blood or other body fluids is anticipated. Gloves should be worn for touching blood and body fluids, mucous membranes, or non-intact skin and for handling items or surfaces contaminated with blood or body fluids. Masks and protective eye wear or face shields shall be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose, and eyes. Protective suits shall be worn during procedures that are likely to generate splashes of blood or other body fluids.

- Hands and other skin surfaces shall be washed immediately and thoroughly if contaminated with blood or other body fluids. Hands shall be washed immediately after gloves are removed, using a disinfectant soap.

- CPR barriers or other ventilation devices should be available for use in areas in which the need for resuscitation is foreseeable.

- Workers who have exudative lesions or weeping dermatitis shall be excluded from handling potentially infectious materials until the condition resolves.

- Pregnant workers should be especially familiar with and strictly adhere to precautions to minimize the risk of transmission.

12.4.2 Personal Protective Equipment

The proper use of PPE is an effective work practice control. The following requirements for PPE are mandatory whenever there is potential for employee contact with blood and bodily fluid:

- Inspect PPE prior to use to verify it is in good working order and without defects.
- Blood or other potentially infectious materials.
- Disposable (single use) gloves, such as surgical or examination gloves, shall be replaced when visibly soiled, torn, punctured, or when their ability to function as a barrier is compromised. Gloves should be changed as soon as possible after contact with blood or body fluids. After use, remove gloves from top to bottom inside out, not allowing unprotected skin to contact the exterior of the gloves. Hands and other skin surfaces shall be washed with disinfectant soap immediately after care has been rendered or clean up has been completed. Gloves reduce the incidence of blood contamination of hands, but they cannot prevent penetrating injuries caused by sharp objects. Do not reuse gloves once removed. A CPR barrier shall be used when administering CPR.
- Protection for the eyes, face, hands, body, feet, and against inhalation hazards shall be provided as appropriate for each job.
- Gloves shall be worn when employee has the potential for the hands to have direct skin contact with blood, other potentially infectious materials, mucous membranes, non-intact skin, and when handling items or surfaces soiled with
- Masks and eye protection or chin-length face shields shall be worn whenever splashes, spray, splatter, droplets, or aerosols of blood or other potentially infectious materials may be generated and there is a potential for eye, nose, or mouth contamination.
- Fluid-resistant clothing (e.g. coated Tyvek suits) shall be worn if there is a potential for splashing or spraying of blood or potentially infectious materials. Coated Tyvek coveralls shall also be worn during clean-up activities involving decontamination or disinfecting of surfaces and articles that have contacted potentially infectious materials, and when preparing biohazard waste for temporary storage and subsequent disposal.
- Fluid-resistant clothing (e.g. coated Tyvek suits) shall be worn if there is a potential for clothing becoming soaked with blood or other potentially infectious materials.
- Fluid-proof coverings shall be worn if there is a potential for shoes or boots to contact blood or other potentially infectious materials.

- Disposable nitrile or vinyl gloves shall be worn for touching blood and body fluids requiring universal precautions, mucous membranes, or non-intact skin and for handling items or surfaces soiled with blood or body fluids to which universal precautions apply.

12.4.3 Waste Handling

All wastes generated as a result of administering emergency first aid care and the subsequent clean-up activities shall be placed in red-bags, labeled as a biohazard, and kept separately from other trash. Wastes used in medical emergency treatment (i.e., gloves, towels, gauze) shall also be bagged and stored in an identical manner. Red-bagged, biohazard waste shall be placed in the 30-gallon collection container, labeled, and secured for temporary storage and disposal. Additional containers shall be obtained as needed and containers shall not be overfilled.

12.5 BIOHAZARD WASTE DISPOSAL

A Shaw Transportation and Disposal Coordinator shall be contacted to arrange for proper disposal of biohazard wastes. The waste shall remain secured on-site in labeled container(s) until disposal arrangements have been made at an approved disposal facility. Disposal of the infectious waste container(s) shall be in accordance with applicable local, state, and federal regulations.

12.6 MEDICAL REQUIREMENTS

Employees receive medical evaluations in accordance with Shaw Procedure HS100 *Medical Policies and Procedures*. The medical requirements of this exposure control plan include provisions for vaccinations to all exposed employees as well as for post-exposure procedures and evaluation. All employees with potential for occupational exposure to blood-borne pathogens shall receive the hepatitis B vaccination and tetanus vaccination prior to workplace exposure, unless they read and sign the Hepatitis B and Tetanus Vaccination Declination Form (see attached).

12.6.1 Hepatitis B Vaccination

All potentially exposed employees will have made available to them at no cost a hepatitis B vaccination. Recombivax or Accelerated Recombivax vaccines shall be utilized. If the employee has previously received the hepatitis B vaccination and/or antibody testing reveals that the employee is immune, a new vaccination is not required. Employees may be subjected to occupational exposure immediately after receiving the first shot in the hepatitis B vaccination series. Antibody testing shall be performed 30-days after completing the

hepatitis B vaccination series. Employees unable to develop immunity shall be precluded from further occupational exposure. If a physician recommends a booster dose(s), the doses shall be provided according to standard recommendations for medical practice. The employee will also receive training as to the vaccine's efficacy, safety, benefits, and consequences prior to administration. The vaccination series may also be initiated within 24-hours of an incident with exposure potential.

12.6.2 Tetanus Vaccination

All employees subject to this policy shall maintain current status documentation of tetanus vaccination (current status for tetanus vaccination is within 5 years.) All potentially exposed employees shall be offered a tetanus vaccination at no cost.

12.6.3 Post-Exposure Procedures and Evaluation

All exposure incidents shall be reported as required by Shaw HS020, Accident Prevention Program: Reporting, Investigation, and Review. The Corporate Medical Director shall be advised in addition to standard notification procedures.

Following a report of an exposure incident, each involved employee shall be offered a confidential medical evaluation and follow-up, which includes at least the following elements:

- Documentation of the route(s) of exposure
- HBV and HIV antibody status of the source patient(s) (if known), and how the exposure occurred.
- The medical confidentiality rights of the source patient shall be preserved at all times.
- If the source patient can be determined and permission is obtained, collection of and testing of the source patient's blood to determine the presence of HIV or HBV infection shall be conducted under the direction of the attending physician.
- Collection of blood from the exposed employee as soon as possible after the exposure incident for the determination of HIV and/or HBV status. Actual core antibody and surface antigen testing of the blood or serum sample may be done at that time or at a later date if the employee so requests. If the test is deferred, arrangements shall be made through the attending physician to properly archive the specimen.
- Follow-up of the exposed employee including antibody and antigen testing, counseling, illness reporting, and safe and effective post-exposure prophylaxis,

according to standard recommendations for medical practice as defined by the Corporate Medical Director.

Where applicable laws require employee consent, documented consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All test results shall be kept confidential.

12.6.4 Physician Information

The following information shall be provided to the evaluating physician:

- A copy of 29 CFR 1910.1030 and its appendices
- A description of the affected employee's duties as they relate to the employee's occupational exposure.

12.6.5 Physician Opinion

For each potentially exposed employee evaluation, the employee shall receive a copy of the evaluating physician's written opinion within 15 working days of the completion of the evaluation. The written opinion shall be limited to the following information:

- The physician's recommended limitations upon the employee's ability to receive hepatitis B vaccination.
- A statement that the employee has been informed of the results of the medical evaluation and that the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials, which require further evaluation or treatment.
- Specific findings or diagnoses, which are related to the employee's ability to receive HBV vaccination. Any other findings and diagnoses shall remain confidential.

12.7 HAZARD COMMUNICATION

There are regulatory requirements for labels, signs, and training. The provisions and exceptions for these are contained in the subsections below.

12.7.1 Warning Labels

Containers used for disposal of blood-contaminated supplies and waste will be labeled in accordance with the word "biohazard." The following symbol shall be an integral part of the label:

12.7.2 Warning Signs

There are no designated areas for medical treatment on-site, because first aid is provided on an emergency basis only; therefore, warning signs are not applicable. In cases of potential exposure, observers and nonessential personnel should be verbally warned to keep a safe distance from injured personnel.

12.7.3 Employee Training Program

All employees who are first aid/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers as described in HS512, *Handling Blood and Other Potentially Infectious Materials* this SSHSP and its addenda, and the general provisions of this procedure.

12.8 RECORDKEEPING

There are federal record-keeping requirements for training, medical, and incident reporting documentation. The provisions for keeping these records are contained in the subsections below.

12.8.1 Training Records

All employees covered under this exposure plan shall be trained as required. A record of the training shall be appropriately generated. The training record will contain the date of the training session(s), the contents or a summary of the training session(s), the names of persons conducting the training, and the names of all persons attending the training sessions.

The training records will be maintained by the Shaw Training Department for at least five (5) years from the training date.

12.8.2 Medical Records

Medical records necessary for Shaw employees will include documentation of HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation.

The employee medical records will be forwarded to and maintained by Health Resources, 600 West Cumming Park, Suite 3400, Woburn, Massachusetts 01801-6350 for inclusion in the employee's medical file. Confidentiality of all medical records shall be maintained.
Shaw maintains employee medical records for the duration of the employee's employment plus 30 years thereafter. If, for whatever reason, Shaw no longer does business and no successor exists, Shaw will notify the director of NIOSH in writing three months prior to the disposal of records. If so directed, the records shall be transferred to the director of NIOSH.

12.8.3 Incident Recording

An incident that occurs as a result of rendering emergency medical care will be recorded on the OSHA 300 log as OSHA defines work-related injuries and illnesses. All injuries involving the release of blood or bodily fluids must be immediately reported to the Project CIH for proper reporting and follow-up.

12.9 PLAN REVIEW AND UPDATE

This Blood-borne Pathogen Exposure Control Plan shall be reviewed and updated on an annual basis.

APPENDIX A
INTERNATIONAL SAFETY CARDS & MATERIAL SAFETY DATA SHEETS (MSDS's)

ON CD ONLY

International Safety Cards for site contaminants are included in this section, as well as MSDS's for chemicals that may be brought to the site.

Site Contaminants:
Coal Tar Pitch Volatiles
Antimony
Arsenic
Cadmium
Chromium
Hexavalent Chrome
Iron
Lead
Nickel
Silver
Thallium

Materials that May be Brought to Site:

Diesel
Lubricating Oil
Gasoline

International Chemical Safety Cards

ANTIMONY

ICSC: 0775

Antimony black
Antimony regulus
Stibium
Sb
Atomic mass: 121.8

ICSC # 0775
CAS # 7440-36-0
RTECS # CC4025000
UN # 2871
October 12, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with oxidants, halogens, acid(s).	water spray, foam, powder, carbon dioxide
EXPLOSION	Finely dispersed particles form explosive mixtures in air. Risk of fire and explosion on contact with	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. (See Ingestion).	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Vomiting. Diarrhoea.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention if you feel unwell.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P2 filter respirator for harmful particles. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting.	Separated from oxidants acids, halogens food and feedstuffs.	Do not transport with food and feedstuffs. UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0775

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ANTIMONY

ICSC: 0775

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
SILVER-WHITE, LUSTROUS, HARD, BRITTLE LUMPS OR DARK GRAY POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On combustion, forms toxic fumes (antimony oxides; see ICSC 0012). Reacts violently with oxidants, , causing fire and explosion hazard. On contact with acids may emit toxic gas (stibine; see ICSC 0776).

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.5 mg/m^3 as TWA (ACGIH 2006).
MAK:
Carcinogen category: 2 Germ cell mutagen group: 3B
(DFG 2006).
OSHA PEL*: TWA 0.5 mg/m^3 *Note: The PEL also applies to other antimony compounds (as Sb).
NIOSH REL*: TWA 0.5 mg/m^3 *Note: The REL also applies to other antimony compounds (as Sb).
NIOSH IDLH: 50 mg/m^3 (as Sb) See: 7440360

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
May cause mechanical irritation to the eyes. Exposure by inhalation and by ingestion could cause gastrointestinal irritation.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis, especially when exposed to fumes. The substance may have effects on the lungs , resulting in pneumoconiosis.

PHYSICAL PROPERTIES

Boiling point: 1635 °C
Melting point: 630 °C
Density: 6.7 g/cm^3

Solubility in water: none

ENVIRONMENTAL DATA

NOTES

Other boiling points: 1325°C, 1440°C, 1587 °C, 1750°C. The recommendations on this card apply only to metallic antimony. See ICSC 0012 antimony trioxide, ICSC 0776 antimony trichloride, ICSC 0220 antimony pentafluoride and ICSC 0776 antimony trihydride.

Transport Emergency Card: TEC (R)-61GT5-III

ADDITIONAL INFORMATION

ICSC: 0775	**ANTIMONY**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ARSENIC

ICSC: 0013

Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X
October 18, 1999 Peer reviewed

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

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ARSENIC

ICSC: 0013

IMPORTANT DATA

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

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.01 mg/m³ as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A;
(DFG 2004).
OSHA PEL: 1910.1018 TWA 0.010 mg/m³
NIOSH REL: Ca C 0.002 mg/m³ 15-minute See Appendix A
NIOSH IDLH: Ca 5 mg/m³ (as As) See: 7440382

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

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

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES	Sublimation point: 613°C Density: 5.7 g/cm³	Solubility in water: none
ENVIRONMENTAL	The substance is toxic to aquatic organisms. It is strongly advised that this substance	

DATA	does not enter the environment.

NOTES

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

Transport Emergency Card: TEC (R)-61GT5-II

ADDITIONAL INFORMATION

ICSC: 0013 **ARSENIC**

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

CADMIUM

ICSC: 0020

UNEP

National Institute for Occupational Safety and Health NIOSH

Cd
Atomic mass: 112.4

ICSC # 0020
CAS # 7440-43-9
RTECS # EU9800000
UN # 2570
EC # 048-002-00-0
April 22, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into	Fireproof. Dry. Keep under inert gas. Separated from igntion sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E

containers. Carefully collect remainder, then remove to safe place.		T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0020

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CADMIUM

ICSC: 0020

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium , causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (Total dust) 0.01 mg/m^3 (Respirable fraction)
0.002 mg/m^3 as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 1; Germ cell mutagen group: 3A;
(DFG 2004).
OSHA PEL*: 1910.1027 TWA 0.005 mg/m^3
*Note: The PEL applies to all Cadmium compounds (as Cd).
NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd).
NIOSH IDLH: Ca 9 mg/m^3 (as Cd) See: IDLH INDEX

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

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in kidney impairment This substance is carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 765°C
Melting point: 321°C
Density: 8.6 g/cm3

Solubility in water: none
Auto-ignition temperature: (cadmium metal dust) 250°C

ENVIRONMENTAL DATA	

NOTES

Reacts violently with fire extinguishing agents such as water,foam,carbon dioxideand halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

ADDITIONAL INFORMATION

ICSC: 0020 **CADMIUM**

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

CHROMIUM

ICSC: 0029

UNEP

National Institute for Occupational Safety and Health NIOSH

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

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

ICSC: 0029

Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
GREY POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m^3 as TWA A4 (ACGIH 2004).
MAK not established.
OSHA PEL*: TWA 1 mg/m^3 See Appendix C
*Note: The PEL also applies to insoluble chromium salts.
NIOSH REL: TWA 0.5 mg/m^3 See Appendix C

NIOSH IDLH: 250 mg/m^3 (as Cr) See: 7440473

ROUTES OF EXPOSURE:

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
May cause mechanical irritation tothe eyesandthe respiratory tract.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES

Boiling point: 2642°C
Melting point: 1900°C
Density: 7.15 g/cm^3

Solubility in water:
none

ENVIRONMENTAL DATA

NOTES

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

(C) IPCS, CEC, 1994

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	U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

FERRIC OXIDE

ICSC: 1577

UNEP

National Institute for Occupational Safety and Health NIOSH

Anhydrous ferric oxide
Iron (III) oxide
Diiron trioxide
Iron trioxide
Ferric sesquioxide
Fe_2O_3
Molecular mass: 159.7

ICSC # 1577
CAS # 1309-37-1
RTECS # NO7400000
UN # See Notes
October 28, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE			
•INHALATION	Cough.	Avoid inhalation of dust	Fresh air, rest.
•SKIN			
•EYES	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P1 filter respirator for inert particles. Sweep spilled substance into covered containers.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1577

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

FERRIC OXIDE

ICSC: 1577

IMPORTANT DATA		
	PHYSICAL STATE; APPEARANCE: REDDISH BROWNTO BLACK CRYSTALS OR POWDER	**ROUTES OF EXPOSURE:**
	PHYSICAL DANGERS:	**INHALATION RISK:** A nuisance-causing concentration of airborne particles can be reached quickly when dispersed, especially if powdered.
	CHEMICAL DANGERS: Reacts with carbon monoxide causing explosion hazard.	**EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation.
	OCCUPATIONAL EXPOSURE LIMITS: TLV: (as Fe) 5 mg/m³ as TWA A4 (ACGIH 2004). MAK: (as the respirable fraction of the aerosol) 1.5 mg/m³ (DFG 2004). OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH REL: See Appendix D NIOSH IDLH: N.D. See: 1309371	**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Lungs may be affected by repeated or prolonged exposure to dust particles , resulting in siderosis, a benign condition.
PHYSICAL PROPERTIES	Melting point: 1565°C Density: 5.24 g/cm3	Solubility in water: none
ENVIRONMENTAL DATA		

NOTES

There is a UN number associated with ferric oxide but this relates to iron oxide, spent, or iron sponge, spent obtained from coal gas purification which is spontaneously combustible.

ADDITIONAL INFORMATION

ICSC: 1577 **FERRIC OXIDE**

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

LEAD

ICSC: 0052

Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # OF7525000
October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:

environment. Personal protection: P3 filter respirator for toxic particles.		

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 3B; Germ cell mutagen group: 3A;
(DFG 2004).
EU OEL: as TWA 0.15 mg/m³ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/m^3 See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/m^3 (as Pb) See: 7439921

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES	Boiling point: 1740°C Melting point: 327.5°C	Density: 11.34 g/cm3 Solubility in water: none
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.	

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

ADDITIONAL INFORMATION

ICSC: 0052 **LEAD**

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International Chemical Safety Cards

NICKEL

ICSC: 0062

UNEP

National Institute for Occupational Safety and Health NIOSH

Ni
Atomic mass: 58.7
(powder)

ICSC # 0062
CAS # 7440-02-0
RTECS # QR5950000
EC # 028-002-00-7
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
•INHALATION	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0062

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International Chemical Safety Cards

NICKEL

ICSC: 0062

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
SILVERY METALLIC SOLID IN VARIOUS FORMS.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel.

OCCUPATIONAL EXPOSURE LIMITS:
TLV:
(Inhalable fraction)
1.5 mg/m³ as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004).
MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah);
Carcinogen category: 1;
(DFG 2004).
OSHA PEL*†: TWA 1 mg/m^3 *Note: The PEL does not apply to Nickel carbonyl.
NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A *Note: The REL does not apply to Nickel carbonyl.
NIOSH IDLH: Ca 10 mg/m^3 (as Ni) See: 7440020

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of the dust.

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

EFFECTS OF SHORT-TERM EXPOSURE:
May cause mechanical irritation. Inhalation of fumes may cause pneumonitis.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 2730°C
Melting point: 1455°C
Density: 8.9 g/cm3

Solubility in water: none

ENVIRONMENTAL DATA

NOTES

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

ADDITIONAL INFORMATION

ICSC: 0062 **NICKEL**

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International Chemical Safety Cards

SILVER

ICSC: 0810

UNEP

National Institute for Occupational Safety and Health NIOSH

Argentium
C.I. 77820
Ag
Atomic mass: 107.9

ICSC # 0810
CAS # 7440-22-4
RTECS # VW3500000
October 09, 1997 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible, except as powder.		
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Separated from ammonia, strong hydrogen peroxide solutions, strong acids.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0810

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

SILVER

ICSC: 0810

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** WHITE METAL, TURNS DARK ON EXPOSURE TO OZONE, HYDROGEN SULFIDE OR SULFUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Shock-sensitive compounds are formed with acetylene. Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry. **OCCUPATIONAL EXPOSURE LIMITS:** TLV (metal): 0.1 mg/m^3 (ACGIH 1997). MAK: 0.1 mg/m^3; (1996) OSHA PEL: TWA 0.01 mg/m^3 NIOSH REL: TWA 0.01 mg/m^3 NIOSH IDLH: 10 mg/m^3 (as Ag) See: IDLH INDEX	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis).
PHYSICAL PROPERTIES	Boiling point: 2212°C Melting point: 962°C	Relative density (water = 1): 10.5 Solubility in water: none
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to aquatic organisms.	

NOTES

ADDITIONAL INFORMATION

ICSC: 0810 **SILVER**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Thallium (soluble compounds, as Tl)

CAS

RTECS

Synonyms & Trade Names
Synonyms vary depending upon the specific soluble thallium compound.

DOT ID & Gui
1707 151 (comp

Exposure Limits

NIOSH REL: TWA 0.1 mg/m^3 [skin]

OSHA PEL: TWA 0.1 mg/m^3 [skin]

IDLH 15 mg/m^3 (as Tl) See: thallium

Conversion

Physical Description
Appearance and odor vary depending upon the specific soluble thallium compound.

Properties vary depending upon the specific soluble thallium compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7300, 7301, 7303, 9102; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.

Up to 1 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face
quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform
selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

Up to 5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel

or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 15 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurrin sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; pares

Target Organs Eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, body hair

See also: INTRODUCTION See MEDICAL TESTS: 0228

CITGO CITGARD® 500 Engine Oil, SAE 15W - 40

Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210

MSDS No. 622315001
Revision Date 5/1/2007

IMPORTANT: This MSDS is prepared in accordance with 29 CFR 1910.1200. Read this MSDS before transporting, handling, storing or disposing of this product and forward this information to employees, customers and users of this product.

Hazard Rankings

	HMIS	NFPA
Health Hazard	1	1
Fire Hazard	1	1
Reactivity	0	0

* = Chronic Health Hazard

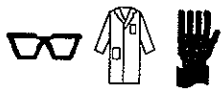
Emergency Overview

Physical State Liquid.
Color Amber to dark amber **Odor** Mild petroleum odor

CAUTION:
Hot oil can cause thermal burns on contact.
"Used" motor oil has been associated with skin cancer in laboratory animals following extended contact.
Spills may create a slipping hazard.

Protective Equipment

Minimum Recommended
See Section 8 for Details



SECTION 1. PRODUCT IDENTIFICATION

Trade Name	CITGO CITGARD® 500 Engine Oil, SAE 15W - 40	**Technical Contact**	(800) 248-4684
Product Number	622315001	**Medical Emergency**	(832) 486-4700
CAS Number	Mixture.	**CHEMTREC Emergency (United States Only)**	(800) 424-9300
Product Family	Motor oil		
Synonyms	Heavy duty motor oil; CITGO® Material Code: 622315001		

SECTION 2. COMPOSITION

Highly-refined petroleum lubricant oils, (CAS No.: Mixture), Conc. 60 to 100
The concentrations of the individual base oils will vary. The individual concentration ranges are as follows:
Distillates, petroleum, hydrotreated heavy paraffinic, (CAS No. 64742-54-7) Conc. 0 - 90%;
Distillates, petroleum, solvent-refined heavy paraffinic, (CAS No. 64741-88-4) Conc. 0 - 90%;
Distillates, petroleum, solvent-dewaxed light paraffinic, (CAS No. 64742-56-9) Conc. 1 - 5%;

Component Name(s)	CAS Registry No.	Concentration (%)
Proprietary Ingredients	Proprietary Mixture	5 - 10
Phosphorodithioic acid, O,O-di-C1-14-alkyl esters, zinc salts	68649-42-3	<2

SECTION 3. HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

Major Route(s) of Entry Skin contact.

Signs and Symptoms of Acute Exposure

 Continued on Next Page

Inhalation	At elevated temperatures or in enclosed spaces, product mist or vapors may irritate the mucous membranes of the nose, the throat, bronchi, and lungs.
Eye Contact	This product can cause transient mild eye irritation with short-term contact with liquid sprays or mists. Symptoms include stinging, watering, redness, and swelling.
Skin Contact	This product can cause mild, transient skin irritation. Skin contact with hot material may result in severe burns.
Ingestion	If swallowed, this material can cause a laxative effect.
Chronic Health Effects Summary	This product contains a petroleum-based mineral oil. Prolonged or repeated skin contact can cause mild irritation and inflammation characterized by drying, cracking, (dermatitis) or oil acne. Repeated or prolonged inhalation of petroleum-based mineral oil mists at concentrations above applicable workplace exposure levels can cause respiratory irritation or other pulmonary effects.
Conditions Aggravated by Exposure	Disorders of the following organs or organ systems that may be aggravated by significant exposure to this material or its components include: Skin
Target Organs	May cause damage to the following organs: skin.
Carcinogenic Potential	This product is not known to contain any components at concentrations above 0.1% which are considered carcinogenic by OSHA, IARC or NTP.

OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

OSHA Health Hazard Classification				OSHA Physical Hazard Classification					
Irritant		Sensitizer		Combustible		Explosive		Pyrophoric	
Toxic		Highly Toxic		Flammable		Oxidizer		Water-reactive	
Corrosive		Carcinogenic		Compressed Gas		Organic Peroxide		Unstable	

SECTION 4. FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Inhalation	Vaporization is not expected at ambient temperatures. This material is not expected to cause inhalation-related disorders under anticipated conditions of use. In case of overexposure, move the person to fresh air.
Eye Contact	Check for and remove contact lenses. Flush eyes with cool, clean, low-pressure water while occasionally lifting and lowering eyelids. Seek medical attention if excessive tearing, redness, or pain persists.
Skin Contact	If burned by hot material, cool skin by quenching with large amounts of cool water. For contact with product at ambient temperatures, remove contaminated shoes and clothing. Wipe off excess material. Wash exposed skin with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists. Thoroughly clean contaminated clothing before reuse. Clean or discard contaminated leather goods. If material is injected under the skin, seek medical attention immediately.
Ingestion	Do not induce vomiting unless directed to by a physician. Do not give anything to drink unless directed to by a physician. Never give anything by mouth to a person who is not fully conscious. Seek medical attention immediately.
Notes to Physician	INGESTION: The viscosity range of the product(s) represented by this MSDS is greater than 100 SUS at 100°F. There is a low risk of aspiration upon ingestion Careful gastric lavage or emesis may be considered to evacuate large quantities of material.

SECTION 5. FIRE FIGHTING MEASURES

NFPA Flammability Classification	NFPA Class-IIIB combustible material.
Flash Point	CLOSED CUP: 212°C (414°F). (Pensky-Martens (ASTM D-93)) OPEN CUP: 248°C (478°F) (Cleveland.).
Lower Flammable Limit	No data. **Upper Flammable Limit** No data.
Autoignition Temperature	Not available.
Hazardous Combustion Products	Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons and oxides of sulfur, phosphorus, zinc and/or nitrogen.
Special Properties	This material can burn but will not readily ignite. This material will release vapors when heated above the flash point temperature that can ignite when exposed to a source of ignition. In enclosed spaces, heated vapor can ignite with explosive force. Mists or sprays may burn at temperatures below the flash point.
Extinguishing Media	Use dry chemical, foam, carbon dioxide or water fog. Water or foam may cause frothing. Carbon dioxide and inert gas can displace oxygen. Use caution when applying carbon dioxide or inert gas in confined spaces.
Protection of Fire Fighters	Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Do not touch damaged containers or spilled material unless wearing appropriate protective equipment. Slipping hazard; do not walk through spilled material. Stop leak if you can do so without risk. For small spills, absorb or cover with dry earth, sand, or other inert non-combustible absorbent material and place into waste containers for later disposal. Contain large spills to maximize product recovery or disposal. Prevent entry into waterways or sewers. In urban area, cleanup spill as soon as possible. In natural environments, seek cleanup advice from specialists to minimize physical habitat damage. This material will float on water. Absorbent pads and similar materials can be used. Comply with all laws and regulations.

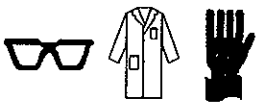
SECTION 7. HANDLING AND STORAGE

Handling	Avoid contamination and extreme temperatures to minimize product degradation. Empty containers may contain product residues that can ignite with explosive force. Do not pressurize, cut, weld, braze solder, drill, grind or expose containers to flames, sparks, heat or other potential ignition sources. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.
Storage	Keep container closed. Do not store with strong oxidizing agents. Do not store at elevated temperatures. Avoid storing product in direct sunlight for extended periods of time. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers or waste residues of this product.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of mists and/or vapors below the recommended exposure limits (see below). An eye wash station and safety shower should be located near the work-station.

Personal Protective Equipment Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.



Eye Protection Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Wear goggles if splashing or spraying is anticipated. Wear goggles and face shield if material is heated above 125°F (51°C). Have suitable eye wash water available.

Hand Protection None required for incidental contact. Use gloves constructed of chemical resistant materials such as heavy nitrile rubber if frequent or prolonged contact is expected. Use heat-protective gloves when handling product at elevated temperatures.

Body Protection Avoid prolonged or repeated skin contact. Use clean protective clothing if splashing or spraying conditions are present such as long-sleeved garment. Remove oil contaminated clothing and launder before reuse. Heavily contaminated clothing and leather goods should be removed promptly and cleaned or discarded.

Respiratory Protection The need for respiratory protection is not anticipated under normal use conditions and with adequate ventilation. If elevated airborne concentrations above applicable workplace exposure levels are anticipated, a NIOSH-approved organic vapor respirator equipped with a dust/mist prefilter should be used. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134).

General Comments Use good personal hygiene practices. Wash hands and other exposed skin areas with plenty of mild soap and water before eating, drinking, smoking, use of toilet facilities, or leaving work. DO NOT use gasoline, kerosene, solvents or harsh abrasives as skin cleaners. Since specific exposure standards/control limits have not been established for this product, the "Oil Mist, Mineral" exposure limits shown below are suggested as minimum control guidelines.

Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels
Oil Mist, Mineral	**ACGIH (United States).** TWA: 5 mg/m^3 STEL: 10 mg/m^3 **OSHA (United States).** TWA: 5 mg/m^3

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)

Physical State	Liquid.	**Color**	Amber to dark amber	**Odor**	Mild petroleum odor
Specific Gravity	0.88 (Water = 1)	**pH**	Not applicable	**Vapor Density**	>1 (Air = 1)
Boiling Range					Not available.

 Continued on Next Page

	Not available.	**Melting/Freezing Point**	
Vapor Pressure	<0.01 mm of Hg (@ 20°C)	**Volatility**	Negligible volatility.
Solubility in Water	Negligible solubility in cold water.	**Viscosity (cSt @ 40°C)**	120

Flash Point CLOSED CUP: 212°C (414°F). (Pensky-Martens (ASTM D-93)) OPEN CUP: 248°C (478°F) (Cleveland.).

Additional Properties Gravity, °API (ASTM D287) = AP 29.0 @ 60° F
Density = AP 7.35 Lbs/gal.
Viscosity (ASTM D2161) = AP 600 SUS @ 100° F

SECTION 10. STABILITY AND REACTIVITY

Chemical Stability Stable. **Hazardous Polymerization** Not expected to occur.

Conditions to Avoid Keep away from extreme heat, sparks, open flame, and strongly oxidizing conditions.

Materials Incompatibility Strong oxidizers.

Hazardous Decomposition Products No additional hazardous decomposition products were identified other than the combustion products identified in Section 5 of this MSDS.

SECTION 11. TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

Toxicity Data

Distillates, petroleum, solvent-refined heavy paraffinic
ORAL (LD50): Acute: >5000 mg/kg [Rat].
DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].

Mineral oil mists derived from highly refined oils are reported to have low acute and sub-acute toxicities in animals. Effects from single and short-term repeated exposures to high concentrations of mineral oil mists well above applicable workplace exposure levels include lung inflammatory reaction, lipoid granuloma formation and lipoid pneumonia. In acute and sub-acute studies involving exposures to lower concentrations of mineral oil mists at or near current work place exposure levels produced no significant toxicological effects. In long term studies (up to two years) no carcinogenic effects have been reported in any animal species tested.

Distillates, petroleum, hydrotreated heavy paraffinic
ORAL (LD50): Acute: >5000 mg/kg [Rat].
DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].

Mineral oil mists derived from highly refined oils are reported to have low acute and sub-acute toxicities in animals. Effects from single and short-term repeated exposures to high concentrations of mineral oil mists well above applicable workplace exposure levels include lung inflammatory reaction, lipoid granuloma formation and lipoid pneumonia. In acute and sub-acute studies involving exposures to lower concentrations of mineral oil mists at or near current work place exposure levels produced no significant toxicological effects. In long term studies (up to two years) no carcinogenic effects have been reported in any animal species tested.

Distillates, petroleum, solvent-dewaxed light paraffinic
ORAL (LD50): Acute: >5000 mg/kg [Rat].
DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].

Mineral oil mists derived from highly refined oils are reported to have low acute and sub-acute toxicities in animals. Effects from single and short-term repeated exposures to high concentrations of mineral oil mists well above applicable workplace exposure levels include lung inflammatory reaction, lipoid granuloma formation and lipoid pneumonia. In acute and sub-acute studies involving exposures to lower concentrations of mineral oil mists at or near current work place exposure levels produced no significant toxicological effects. In long term studies (up to two years) no carcinogenic effects have been reported in any animal species tested.

Phosphorodithioic acid, O,O-di-C1-14-alkyl esters, zinc salts

ORAL (LD50):	Acute: >2000 mg/kg [Rabbit]. >2890 mg/kg [Rat].
DERMAL (LD50):	Acute: >2000 mg/kg [Rabbit].

INHALATION (LC50), Acute: > 1310 mg/L (Rat screen level)(4 hours).
DRAIZE EYE, Acute: Moderate to severe eye irritant. (Rabbit).
DRAIZE DERMAL, Acute: Mild to moderate skin irritant. (Rabbit).
BUEHLER DERMAL, Acute: Non-sensitizing. (Guinea Pig).
28-Day DERMAL, Sub-Chronic: Severe skin irritant. (Rabbit). Reported reduced food consumption resulting in weight loss and testicular atrophy.

Engine oil

Used motor oil was associated with cancer in lifetime skin painting studies with laboratory animals. Avoid prolonged or repeated contact with used motor oil. Use of good hygiene practices will reduce the liklihood of potential health effects.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Analysis for ecological effects has not been conducted on this product. However, if spilled, this product and any contaminated soil or water may be harmful to human, animal, and aquatic life. Also, the coating action associated with petroleum and petroleum products can be harmful or fatal to aquatic life and waterfowl.

Environmental Fate

An environmental fate analysis is not available for this specific product. Plants and animals may experience harmful or fatal effects when coated with petroleum products. Petroleum-based (mineral) lubricating oils normally will float on water. In stagnant or slow-flowing waterways, an oil layer can cover a large surface area. As a result, this oil layer might limit or eliminate natural atmospheric oxygen transport into the water. With time, if not removed, oxygen depletion in the waterway may be sufficient to cause a fish kill or create an anaerobic environment. This material contains phosphorus which is a controlled element for disposal in effluent waters in most sections of North America. Phosphorus is known to enhance the formation of algae. Severe algae growth can reduce oxygen content in the water possibly below levels necessary to support marine life.

SECTION 13. DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Conditions of use may cause this material to become a "hazardous waste", as defined by federal or state regulations. It is the responsibility of the user to determine if the material is a "hazardous waste" at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR 260 through 40 CFR 271). State and/or local regulations may be more restrictive. Contact your regional US EPA office for guidance concerning case specific disposal issues. Empty drums and pails retain residue. DO NOT pressurize, cut, weld, braze, solder, drill, grind, or expose this product's empty container to heat, flame, or other ignition sources. DO NOT attempt to clean it. Empty drums and pails should be drained completely, properly bunged or sealed, and promptly sent to a reconditioner.

SECTION 14. TRANSPORT INFORMATION

The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.

US DOT Status Not regulated by the U.S. Department of Transportation as a hazardous material.

Proper Shipping Name Not regulated.

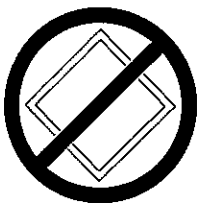
Hazard Class Not regulated.

Packing Group(s) Not applicable.

UN/NA Number Not regulated.

Reportable Quantity A Reportable Quantity (RQ) has not been established for this material.

Placard(s)



Emergency Response Guide No. Not applicable.

MARPOL III Status Not a DOT "Marine Pollutant" per 49 CFR 171.8.

SECTION 15. REGULATORY INFORMATION

TSCA Inventory This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.

SARA 302/304 Emergency Planning and Notification The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.

SARA 311/312 Hazard Identification The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories:

No SARA 311/312 hazard categories identified.

SARA 313 Toxic Chemical Notification and Release Reporting This product contains the following components in concentrations above *de minimis* levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA:
Zinc and Zinc Compounds, Concentration: <2%

CERCLA The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are:
Zinc and Zinc Compounds, Concentration: <2%

Clean Water Act (CWA) This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.

California Proposition 65

CITGO CITGARD® 500 Engine Oil, SAE 15W - 40

This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Toluene: <0.002%

New Jersey Right-to-Know Label Motor oil

Additional Remarks No additional regulatory remarks.

SECTION 16. OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

REVISION INFORMATION

Version Number 5.0

Revision Date 5/1/2007

ABBREVIATIONS

AP: Approximately EQ: Equal >: Greater Than <: Less Than NA: Not Applicable ND: No Data NE: Not Establishe

ACGIH: American Conference of Governmental Industrial Hygienists

AIHA: American Industrial Hygiene Associatior

IARC: International Agency for Research on Cancer

NTP: National Toxicology Program

NIOSH: National Institute of Occupational Safety and Health

OSHA: Occupational Safety and Health Administration

NPCA: National Paint and Coating Manufacturers Association

HMIS: Hazardous Materials Information System

NFPA: National Fire Protection Association

EPA: US Environmental Protection Agency

DISCLAIMER OF LIABILITY

THE INFORMATION IN THIS MSDS WAS OBTAINED FROM SOURCES WHICH WE BELIEVE ARE RELIABLE. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESSED OR IMPLIED REGARDING ITS CORRECTNESS. SOME INFORMATION PRESENTED AND CONCLUSIONS DRAWN HEREIN ARE FROM SOURCES OTHER THAN DIRECT TEST DATA ON THE SUBSTANCE ITSELF. THIS MSDS WAS PREPARED AND IS TO BE USED ONLY FOR THIS PRODUCT. IF THE PRODUCT IS USED AS A COMPONENT IN ANOTHER PRODUCT, THIS MSDS INFORMATION MAY NOT BE APPLICABLE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION OR PRODUCTS FOR THEIR PARTICULAR PURPOSE.

THE CONDITIONS OR METHODS OF HANDLING, STORAGE, USE, AND DISPOSAL OF THE PRODUCT ARE BEYOND OUR CONTROL AND MAY BE BEYOND OUR KNOWLEDGE. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.

***** END OF MSDS *****

CITGO Gasolines, All Grades Unleaded

Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210

MSDS No. UNLEAD
Revision Date 05/23/2005

IMPORTANT: Read this MSDS before handling or disposing of this product and pass this information on to employees, customers and users of this product.

Hazard Rankings

	HMIS	NFPA
Health Hazard	* 2	1
Fire Hazard	3	3
Reactivity	0	0

* = Chronic Health Hazard

Emergency Overview

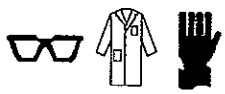
Physical State Liquid.

Color Transparent, clear to amber or red. **Odor** Pungent, characteristic gasoline.

DANGER:
Extremely flammable liquid; vapor may cause flash fire or explosion.
Vapor may travel considerable distance to source of ignition and flash back.
Use Only as a Motor Fuel. Do Not Siphon by Mouth.
Harmful or fatal if swallowed - Can enter lungs and cause damage.
High concentrations of vapor reduce oxygen available for breathing and may cause suffocation.
May be harmful if inhaled or absorbed through the skin.
Mist or vapor may irritate the eyes, mucous membranes, and respiratory tract.
Liquid contact may cause eye and skin irritation.
Overexposures may cause central nervous system (CNS) depression and target organ effects (See Section 3).
Harmful or fatal if swallowed - Can enter lung and cause damage.
Inhalation overexposure can increase the heart's susceptibility to arrhythmias (irregular beats).
Contains Benzene - Cancer Hazard.
Long term exposure to gasoline vapor has caused cancer in laboratory animals.
Avoid Spills. Spills may present both a physical and an environmental hazard.

Protective Equipment

Minimum Recommended
See Section 8 for Details



SECTION 1. PRODUCT IDENTIFICATION

Trade Name	CITGO Gasolines, All Grades Unleaded	**Technical Contact**	(800) 248-4684
Product Number	Various	**Medical Emergency**	(832) 486-4700
CAS Number	Mixture.	**CHEMTREC Emergency (United States Only)**	(800) 424-9300

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CITGO Gasolines, All Grades Unleaded

Product Family Motor fuels.

Synonyms Unleaded Gasolines; Motor Gasolines; Petrol; Automobile Motor Fuels; Finished Gasolines; Gasoline, Regular Unleaded; Gasoline, Mid-grade Unleaded; Gasoline, Premium Unleaded; Reformulated Gasolines (RFG); Reformulated Motor Fuels; Oxygenated Motor Spirits; Gasoline, Regular Reformulated; Gasoline, Mid-grade Reformulated; Gasoline, Premium Reformulated.

SECTION 2. COMPOSITION

Gasoline is a complex and variable mixture that originates from finished refinery streams. These streams can contain the hydrocarbons and oxygenated chemicals (oxygenates) listed below that are regulated or are associated with certain potential health effects. The typical concentration of oxygenates in gasoline does not exceed 18% (v/v).

Component Name(s)	CAS Registry No.	Concentration (%)
Methyl tertiary-Butyl Ether (MTBE)	1634-04-4	0 - 15
Tertiary-Amyl Methyl Ether (TAME)	994-05-8	0 - 15
Ethyl tertiary Butyl Ether (ETBE)	637-92-3	0 - 15
Tertiary-Amyl Ethyl Ether (TAEE)	919-94-8	0 - 15
Diisopropyl Ether (DIPE)	108-20-3	0 - 15
Ethanol	64-17-5	0 - 10
Toluene	108-88-3	<20
Xylene, all isomers	1330-20-7	<18
n-Hexane	110-54-3	<8
Trimethylbenzenes, all isomers	25551-13-7	<5
Benzene	71-43-2	<5
Cumene	98-82-8	<4
Ethylbenzene	100-41-4	<4
Cyclohexane	110-82-7	<3
Naphthalene	91-20-3	<2
Styrene	100-42-5	<1

SECTION 3. HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

Major Route(s) of Entry Skin contact. Eye contact. Inhalation. Ingestion.

Signs and Symptoms of Acute Exposure

Inhalation Breathing high concentrations may be harmful. Mist or vapor can irritate the throat and lungs. Breathing this material may cause central nervous system depression with symptoms including nausea, headache, dizziness, fatigue, drowsiness, or unconsciousness. Breathing high concentrations of this material, for example, in an enclosed space or by intentional abuse, can cause irregular heartbeats which can cause death.

Eye Contact This product can cause eye irritation with short-term contact with liquid, mists or vapor. Symptoms include stinging, watering, redness, and swelling. In severe cases, permanent eye damage can result.

Skin Contact This material can cause skin irritation. The severity of irritation will depend on the amount of material that is applied to the skin and the speed and thoroughness that it is removed. It is likely that some components of this material are able to pass into the body through the skin and may cause similar effects as from breathing or swallowing it. If the skin is damaged, absorption increases.

Ingestion

 Continued on Next Page

If swallowed, this material may irritate the mucous membranes of the mouth, throat, and esophagus. It can be readily absorbed by the stomach and intestinal tract. Symptoms include a burning sensation of the mouth and esophagus, nausea, vomiting, dizziness, staggered gait, drowsiness, loss of consciousness and delirium, as well as additional central nervous system (CNS) effects.

Due to its light viscosity, there is a danger of aspiration into the lungs during swallowing and subsequent vomiting. Aspiration can result in severe lung damage or death. Cardiovascular effects include shallow rapid pulse with pallor (loss of color in the face) followed by flushing (redness of the face). Also, progressive CNS depression, respiratory insufficiency and ventricular fibrillation leads to death.

Chronic Health Effects Summary

Intentional misuse by deliberately concentrating and inhaling gasoline can be harmful or fatal. Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage ("Petrol Sniffers Encephalopathy"), delirium, seizures and sudden death are associated with repeated abuse of gasoline or naphtha.

Chronic effects of ingestion and subsequent aspiration into the lungs may include pneumatocele (lung cavity) formation and chronic lung dysfunction.

Benzene, a component of this product, causes blood disorders and damages the bone marrow (certain types of anemia, leukemia, and lymphoma). It is also capable of causing changes in living cells' genetic material (chromosomes). Benzene is considered to be a mutagen and a cancer-causing agent (leukemogen).

Repeated and prolonged overexposure to n-hexane has been associated with peripheral nerve tissue damage. Adverse effects include numbness, tingling, pain, and loss of muscle control in the extremities, disorientation, impaired vision and reflexes, decline in motor function and paralysis.

Prolonged or repeated overexposure to toluene, a component of this product, has been associated with reproductive effects in experimental animals and in long-term chemical abuse situations. Long-term overexposure to toluene has been associated with impaired color vision. Also, long-term overexposure to toluene in occupational environments have been associated with hearing damage.

Prolonged or repeated overexposure to xylene, a component of this product, has been associated with hearing damage in laboratory animals. Repeated overexposure may cause injury to bone marrow, blood cells, kidney, and liver.

Refer to Section 11 of this MSDS for additional health-related information.

Conditions Aggravated by Exposure

Disorders of the following organs or organ systems that may be aggravated by significant exposure to this material or its components include: Skin, Respiratory System, Liver, Kidneys, Central Nervous System (CNS), Cardiovascular System, Blood-forming system

Target Organs

May cause damage to the following organs: blood, kidneys, lungs, the reproductive system, liver, mucous membranes, heart, peripheral nervous system, cardiovascular system, upper respiratory tract, skin, auditory system, bone marrow, central nervous system (CNS), eye, lens or cornea.

Carcinogenic Potential

This material may contain benzene, ethylbenzene, naphthalene or styrene at concentrations above 0.1%. Benzene is considered to be a known human carcinogen by OSHA, IARC and NTP. IARC has identified ethylbenzene, styrene, naphthalene, gasoline and gasoline engine exhaust as possibly carcinogenic to humans (Group 2B) based on laboratory animal studies.

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OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

OSHA Health Hazard Classification				OSHA Physical Hazard Classification					
Irritant	X	Sensitizer		Combustible		Explosive		Pyrophoric	
Toxic		Highly Toxic		Flammable	X	Oxidizer		Water-reactive	
Corrosive		Carcinogenic	X	Compressed Gas		Organic Peroxide		Unstable	

SECTION 4. FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Inhalation

Immediately move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately. If exposed to benzene in an emergency situation, a medical evaluation should be completed at the end of the work-shift in accordance with OSHA requirements.

Eye Contact

Flush eyes with cool, clean, low-pressure water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of the eye and eyelid tissue. If easily accomplished, check for and remove contact lenses. If contact lenses cannot be removed, seek immediate medical attention. Do not use eye ointment. Seek medical attention.

Skin Contact

Remove contaminated shoes and clothing. Flush affected area with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. Do not use ointments. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists.

Ingestion

Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Never give anything by mouth to a person who is not fully conscious. Do not leave victim unattended. Seek medical attention immediately.

Notes to Physician

INHALATION: Inhalation overexposure can produce toxic effects. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Administer supplemental oxygen with assisted ventilation, as required.

This material (or a component) sensitizes the heart to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material. Administion of sympathomimetic drugs should be avoided.

INGESTION: If ingested, this material presents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended. Consider activated charcoal and/or gastric lavage. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

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SECTION 5. FIRE FIGHTING MEASURES

NFPA Flammability Classification	NFPA Class-IB flammable liquid.
Flash Point	Closed cup: -43°C (-45°F). (Tagliabue [ASTM D-56])
Lower Flammable Limit	AP 1.4 % **Upper Flammable Limit** AP 7.6 %
Autoignition Temperature	280°C (536°F)
Hazardous Combustion Products	Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons, aldehydes and other products of incomplete combustion.
Special Properties	Flammable Liquid! This material releases vapors at or below ambient temperatures. When mixed with air in certain proportions and exposed to an ignition source, its vapor can cause a flash fire. Use only with adequate ventilation. Vapors are heavier than air and may travel long distances along the ground to an ignition source and flash back. A vapor and air mixture can create an explosion hazard in confined spaces such as sewers. If container is not properly cooled, it can rupture in the heat of a fire.
Extinguishing Media	SMALL FIRE: Use dry chemicals, carbon dioxide, foam, or inert gas (nitrogen). Carbon dioxide and inert gas can displace oxygen. Use caution when applying carbon dioxide or inert gas in confined spaces. LARGE FIRE: Use foam, water fog, or water spray. Water May Be Ineffective. Water may not extinguish the fire. Water fog and spray are effective in cooling containers and adjacent structures. However, water can be used to cool the external walls of vessels to prevent excessive pressure, autoignition or explosion. DO NOT use a solid stream of water directly on the fire as the water may spread the fire to a larger area.
Protection of Fire Fighters	Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles. Cover pooling liquid with foam. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines. Be aware that burning liquid will float on water. Notify appropriate authorities of potential fire and explosion hazard if liquid enter sewers or waterways.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Flammable Liquid! Release causes an immediate fire or explosion hazard. Evacuate all non-essential personnel from immediate area and establish a "regulated zone" with site control and security. A vapor-suppressing foam may be used to reduce vapors. Eliminate all ignition sources. All equipment used when handling this material must be grounded. Stop the leak if it can done without risk. Do not touch or walk through spilled material. Remove spillage immediately from hard, smooth walking areas. Prevent spilled material from entering waterways, sewers, basements, or confined areas. Absorb or cover with dry earth, sand, or other non-combustible material and transfer to appropriate waste containers. Use clean, non-sparking tools to collect absorbed material.

For large spills, secure the area and control access. Prevent spilled material from entering sewers, storm drains, other drainage systems, and natural waterways. Dike far ahead of a

liquid spill to ensure complete collection. Water mist or spray may be used to reduce or disperse vapors; but, it may not prevent ignition in closed spaces. This material will float on water and its run-off may create an explosion or fire hazard. Verify that responders are properly HAZWOPER-trained and wearing appropriate respiratory equipment and fire-resistant protective clothing during cleanup operations. In an urban area, cleanup spill as soon as possible; in natural environments, cleanup on advice from specialists. Pick up free liquid for recycle and/or disposal if it can be accomplished safely with explosion-proof equipment. Collect any excess material with absorbant pads, sand, or other inert non-combustible absorbent materials. Place into appropriate waste containers for later disposal. Comply with all applicable local, state and federal laws and regulations.

SECTION 7. HANDLING AND STORAGE

Handling

FLAMMABLE LIQUID AND VAPOR. **USE ONLY as a motor fuel.** DO NOT siphon by mouth. DO NOT use as a lighter fluid, solvent or cleaning fluid. Prior to handling or refueling, stop all engines and auxillary equipment. Turn off all electronic equipment including cellular telephones. DO NOT leave nozzle unattended during filling or refueling a vehicle. DO NOT re-enter vehicle while refueling. Keep nozzle spout in contact with the container during the entire filling operations.

A static electrical charge can accumulate when this material is flowing through pipes, nozzles or filters and when it is agitated. A static spark discharge can ignite accumulated vapors particularly during dry weather conditions. Always bond receiving containers to the fill pipe before and during loading. Always keep nozzle in contact with the container throughout the loading process. Do not fill any portable container in or on a vehicle. Special precautions, such as reduced loading rates and increased monitoring, must be observed during "switch loading" operations (i.e., loading this material in tanks or shipping compartments that previously contained middle distillates or similar products).

A spill or leak can cause an immediate fire hazard. Keep containers closed and do not handle or store near heat, sparks, or any other potential ignition sources. Do not contact with oxidizable materials. Do not breathe vapor. Use only with adequate ventilation and personal protection. Never siphon by mouth. Avoid contact with eyes, skin, and clothing. Prevent contact with food and tobacco products. Do not take internally.

When performing repairs and maintenance on contaminated equipment, keep unnecessary persons away from the area. Eliminate all potential ignition sources. Drain and purge equipment, as necessary, to remove material residues. Follow proper entry procedures, including compliance with 29 CFR 1910.146 prior to entering confined spaces such as tanks or pits. Use gloves constructed of impervious materials and protective clothing if direct contact is anticipated. Provide ventilation to maintain exposure potential below applicable exposure limits. Use appropriate respiratory protection when concentrations exceed any established occupational exposure level (See Section 8). Promptly remove contaminated clothing. Wash exposed skin thoroughly with soap and water after handling.

Protect the environment from releases of this material. Prevent discharges to surface waters and groundwater. Maintain handling, transfer and storage equipment in proper working order.

Misuse of empty containers can be dangerous. Empty containers may contain material residues which can ignite with explosive force. **Cutting or welding of empty containers can cause fire, explosion, or release of toxic fumes from residues.** Do not pressurize or expose empty containers to open flame, sparks, or heat. Keep container closed and drum bungs in place. All label warnings and precautions must be observed. Return empty drums to a qualified reconditioner. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling, or disposing of empty containers and/or waste residues of this material.

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Storage

Store and transport in accordance with all applicable laws. Keep containers tightly closed. Store in a cool, dry, well-ventilated place. Clearly label all containers. Do not allow containers to be kept in enclosed vehicles. Keep away from all ignition sources. Ground all equipment containing this material. Containers must be able to withstand pressures that are created from changes in product temperature. Product samples and other small containers of this flammable liquid should be stored in a separate safety cabinet or room. All electrical equipment in areas where this material is stored or handled should be installed and operated in accordance with applicable regulatory requirements and the National Electrical Code.

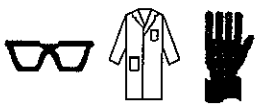
SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

Provide ventilation or other engineering controls to keep the airborne concentrations of vapor or mists below the applicable workplace exposure limits indicated below. All electrical equipment should comply with the National Electric Code. An emergency eye wash station and safety shower should be located near the work-station.

Personal Protective Equipment

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.



Eye Protection

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

Hand Protection

Avoid skin contact. Use gloves (e.g., disposable PVC, neoprene, nitrile, vinyl, or PVC/NBR). Wash hands with plenty of mild soap and water before eating, drinking, smoking, use of toilet facilities or leaving work. DO NOT use this material as a skin cleaner.

Body Protection

Avoid skin contact. Wear long-sleeved fire-retardant garments (e.g., Nomex®) while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, boots and additional facial protection. If product comes in contact with clothing, immediately remove soaked clothing and shower. Promptly remove and discard contaminated leather goods.

Respiratory Protection

For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For airborne vapor concentrations that exceed the recommended protection factors for organic vapor respirators, use a full-face, positive-pressure, supplied air respirator. Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 10% of the lower flammable limit of this product.

General Comments

Warning! Use of this material in spaces without adequate ventilation may result in generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels

CITGO Gasolines, All Grades Unleaded

Gasoline	**ACGIH (United States).** TWA: 300 ppm 8 hour(s). STEL: 500 ppm 15 minute(s).
Toluene	**ACGIH (United States). Skin** TWA: 50 ppm 8 hour(s). **OSHA (United States).** TWA: 200 ppm 8 hour(s). CEIL: 300 ppm PEAK: 500 ppm
Xylene, all isomers	**ACGIH (United States).** TWA: 100 ppm 8 hour(s). STEL: 150 ppm 15 minute(s). **OSHA (United States).** TWA: 100 ppm 8 hour(s).
Tertiary-Amyl Methyl Ether (TAME)	**ACGIH TLV (United States).** TWA: 20 ppm 8 hour(s).
Methyl tertiary-Butyl Ether (MTBE)	**ACGIH (United States).** TWA: 50 ppm 8 hour(s).
Ethyl tertiary Butyl Ether (ETBE)	**ACGIH TLV (United States).** TWA: 5 ppm 8 hour(s).
n-Hexane	**ACGIH (United States). Skin** TWA: 50 ppm 8 hour(s). **OSHA (United States).** TWA: 500 ppm 8 hour(s).
Cumene	**ACGIH (United States).** TWA: 50 ppm 8 hour(s). **OSHA (United States). Skin** TWA: 50 ppm 8 hour(s).
Trimethylbenzenes, all isomers	**ACGIH (United States).** TWA: 25 ppm 8 hour(s).
Benzene	**ACGIH (United States). Skin** TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s). **OSHA (United States). Skin Notes: See Table Z-2 for exclusions in 20 CFR 1910.1028 to the PEL.** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s).
Ethylbenzene	**ACGIH (United States).** TWA: 100 ppm 8 hour(s). STEL: 125 ppm 15 minute(s). **OSHA (United States).** TWA: 100 ppm 8 hour(s).
Cyclohexane	**ACGIH (United States).** TWA: 100 ppm 8 hour(s). **OSHA (United States).** TWA: 300 ppm 8 hour(s).
Naphthalene	**ACGIH (United States). Skin** TWA: 10 ppm 8 hour(s). STEL: 15 ppm 15 minute(s). **OSHA (United States).** TWA: 10 ppm 8 hour(s).
Styrene	**ACGIH (United States).** TWA: 20 ppm 8 hour(s). STEL: 40 ppm 15 minute(s). **OSHA (United States).** TWA: 100 ppm 8 hour(s). STEL: 200 ppm 15 minute(s). PEAK: 600 ppm

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)

Physical State	Liquid.	**Color**	Transparent, clear to amber or red.	**Odor**	Pungent, characteristic gasoline.
Specific Gravity	0.72 - 0.77 (Water = 1)	**pH**	Not applicable	**Vapor Density**	3 to 4 (Air = 1)
Boiling Range	38 to 204°C (100 to 400°F)			**Melting/Freezing Point**	Not available.
Vapor Pressure	220 to 450 mm Hg at 20°C (68°F) or 6 to 15 Reid-psia at 37.8°C (100°F).			**Volatility**	720 to 770 g/l VOC (w/v)
Solubility in Water	Hydrocarbon components of gasoline are slightly soluble in water. Oxygenate components, such as MTBE, are more soluble than the hydrocarbon components. Ethanol has greater solubility in water than hydrocarbon components or other oxygenate components.			**Viscosity (cSt @ 40°C)**	<1
Flash Point	Closed cup: -43°C (-45°F). (Tagliabue [ASTM D-56])				
Additional Properties	Average Density at 60°F = 6.0 to 6.4 lbs./gal. (ASTM D-2161)				

SECTION 10. STABILITY AND REACTIVITY

Chemical Stability	Stable.	**Hazardous Polymerization**	Not expected to occur.
Conditions to Avoid	Keep away from heat, flame and other potential ignition sources. Keep away from strong oxidizing conditions and agents.		
Materials Incompatibility	Strong acids, alkalies and oxidizers such as liquid chlorine, other halogens, hydrogen peroxide and oxygen.		
Hazardous Decomposition Products	No additional hazardous decomposition products were identified other than the combustion products identified in Section 5 of this MSDS.		

SECTION 11. TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

Toxicity Data

Gasoline:
VAPOR (TELo) Acute: 140 ppm (Human) (8 hours) - Mild eye irritant.
VAPOR (TELo) Acute: 500 ppm (Human) (1 hour) - Moderate eye irritant.
INHALATION (TCLo) Acute: 900 ppm (Human) (1 hour) - CNS and pulmonary effects.
DERMAL (TDLo) Acute: 53 mg/kg (Human) - Skin allergy effects.
INHALATION (LC50) Acute: 101,200 ppm (Rat, Mouse, & Guinea Pig) (5 minutes).

Gasoline Containing 15% MTBE:
ORAL (LD50) Acute: >5,000 mg/kg (Rat screen level).
DERMAL (LD50) Acute: >2,000 mg/kg (Rabbit screen level).
INHALATION (LC50) Acute: >5,200 ppm (Rat screen level) (8 hours).
DRAIZE EYE Acute: Mild eye irritant. (Rabbit).

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DRAIZE DERMAL Acute: Moderate skin irritant. (Rabbit).
BUEHLER DERMAL Acute: Non-sensitizing. (Guinea Pig).
28-Day DERMAL Sub-Chronic: Severe skin irritant. (Rabbit).

A major epidemiological study concluded that there was no increased risk of kidney cancer associated with gasoline exposures for petroleum refinery employees or neighboring residents. Another study identified a slight trend in kidney cancers among service station employees following a 30-year latency period. Two-year inhalation toxicity studies with fully vaporized unleaded gasoline (at concentrations of 67, 292 and 2,056 ppm in air) produced kidney damage and kidney tumors in male rats, but not in female rats or mice of either sex. Results from subsequent scientific studies suggest that the kidney damage, and probably the kidney tumor response, is limited to the male rat. The kidney tumors apparently were the result of the formation of alpha-2u-globulin, a protein unique to male rats. This finding is not considered relevant to human exposure. Under conditions of the study, there was no evidence that exposure to unleaded gasoline vapor is associated with developmental toxicity. Experimental studies with laboratory animals did suggest that overexposure to gasoline may adversely effect male reproductive performance. Also, in laboratory studies with rats, the maternal and developmental "no observable adverse effect level" (NOAEL) was determined to be 9,000 ppm (75% of the LEL value). Female mice developed a slightly higher incidence of liver tumors compared to controls at the highest concentration. In a four week inhalation study of Sprague Dawley® rats, gasoline vapor condensate was determined to induce sister chromatid exchanges in peripheral lymphocytes. IARC has listed gasoline as possibly carcinogenic to humans (Group 2B).

Pentanes, all isomers:
Studies of pentane isomers in laboratory animals indicate exposure to extremely high levels (roughly 10 vol.%) may induce cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

Toluene:
Effects from Acute Exposure:
Deliberate inhalation of toluene at high concentrations (e.g., glue sniffing and solvent abuse) has been associated with adverse effects on the liver, kidney and nervous system and can cause CNS depression, cardiac arrhythmias and death. Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects.

Effects from Repeated or Prolonged Exposure:
Studies of workers indicate long-term exposure may be related to impaired color vision and hearing. Some studies of workers suggest long-term exposure may be related to neurobehavioral and cognitive changes. Some of these effects have been observed in laboratory animals following repeated exposure to high levels of toluene. Several studies of workers suggest long-term exposure may be related to small increases in spontaneous abortions and changes in some gonadotropic hormones. However, the weight of evidence does not indicate toluene is a reproductive hazard to humans. Studies in laboratory animals indicate some changes in reproductive organs following high levels of exposure, but no significant effects on mating performance or reproduction were observed. Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Findings in laboratory animals were largely negative. Positive findings include small increases in minor skeletal and visceral malformations and developmental delays following very high levels of maternal exposure. Studies of workers indicate long-term exposure may be related to effects on the liver, kidney and blood, but these appear to be limited to changes in serum enzymes and decreased leukocyte counts. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland following very high levels of exposure. The relevance of these findings to humans is not clear at this time.

Heptane, all isomers:
n-Heptane was not mutagenic in the Salmonella/microsome (Ames) assay and is not considered to be carcinogenic.

Xylene, all isomers:
Effects from Acute Exposure:
ORAL (LD_{50}), Acute: 4,300 mg/kg [Rat].
INHALATION (LC_{50}), Acute: 4,550 ppm for four hours [Rat].
DERMAL (LD_{50}), Acute: 14,100 uL/kg [Rabbit].
Overexposure to xylene may cause upper respiratory tract irritation, headache, cyanosis, blood serum changes, CNS damage and narcosis. Effects may be increased by the use of alcoholic beverages. Evidence of liver and kidney impairment were reported in workers recovering from a gross over-exposure.

Effects from Prolonged or Repeated Exposure:
Impaired neurological function was reported in workers exposed to solvents including xylene. Studies in laboratory animals have shown evidence of impaired hearing following high levels of exposure. Studies in laboratory animals suggest some changes in reproductive organs following high levels of exposure but no significant effects on reproduction were observed. Studies in laboratory animals indicate skeletal and visceral malformations, developmental delays, and increased fetal resorptions following extremely high levels of maternal exposure. Adverse effects on the liver, kidney, bone marrow (changes in blood cell parameters) were observed in laboratory animals following high levels of exposure. The relevance of these observations to humans is not clear at this time.

Ethyl tertiary Butyl Ether (ETBE):
ETBE can cause eye, skin and mucous membrane irritation. In a four week inhalation study, moderate ataxia was observed in rats at the highest dose level (4,000 ppm). The test animals appeared normal within 15 minutes of termination of exposure. A no observed adverse effect level (NOAEL) of 500 ppm was indicated by the study authors based on neurotoxic effects. In two unpublished 90 day inhalation studies, rats and mice were exposed six hour/day, five days/week at concentrations of 0, 500, 1750 and 5000 ppm of ETBE vapor. The male rats exhibited time and concentration-dependent nephropathy consistent with alpha-2μ-globulin formation. An ETBE NOAEL for male rats of 500 ppm was suggested based on a finding of testicular lesions. In human studies with eight males, slight, but significant ($p<0.05$) decreases in objective pulmonary function measures after exposure to ETBE at concentrations of 25 and 50 ppm for two hours.

Tertiary-Amyl Methyl Ether (TAME):
TAME was found to be negative for the induction of structural chromosome aberrations (both metabolically-activated and non-activated) in Chinese hamster ovary (CHO) cells. Inhalation of TAME vapors at concentrations above 250 ppm produced reversible CNS depression in rats and mice. In a four week inhalation study, increases in liver weights with no tissue injury were observed in rats exposed to a TAME concentration of 500 ppm. Birth defects in mice and fetotoxicity in both rats and mice were observed after inhalation exposures to maternally toxic concentrations of TAME.

Methyl tertiary-Butyl Ether (MTBE):
Acute symptoms associated with human exposure to MTBE appear to be mild and transient. In laboratory studies, rats and mice exposed to high doses of MTBE exhibited blood chemistry changes and liver and kidney abnormalities. In laboratory studies, MTBE vapor exposure at the high dose concentration was associated with an increased incidence of liver tumors in female mice. Also, at high dose concentration exposures, MTBE was associated with an increased incidence of kidney and testicular (Leydig cell) tumors in male rats. Additional oncogenicity studies on rats resulted in testicular tumors following administration by ingestion. These data are not generally considered relevant to humans. NTP has not identified MTBE as either a known carcinogen or reasonably anticipated to be carcinogenic to humans. In animal studies, developmental and reproductive toxicity related to MTBE inhalation exposures was observed only at concentrations that were maternally toxic. MTBE was shown to be maternally toxic at 4,000 and 8,000 ppm levels when mice were exposed for six hours per day during their pregnancy. Also, a decrease in the number of successful pregnancies and a reduction in birth weights were observed at these exposure levels. Birth defects (cleft palate) were observed at the high dose level. These data suggest that the risk of developmental and reproductive toxicity in humans is negligible as a result of anticipated

exposures to MTBE.

Diisopropyl Ether (DIPE):
Increased kidney and liver weights were observed in rats and mice in subchronic and chronic inhalation studies of DIPE. Also, evidence of microscopic changes (hyaline droplets) were reported in liver tissue and kidney tubules of rabbits and male rats exposed to DIPE at concentrations of 7,100 ppm. These findings were similar those found in gasoline studies. Overexposure by inhalation of pregnant rats to DIPE at concentrations of 3,095 and 6,745 ppm increased the frequency of rudimentary 14th ribs in the offspring. This effect was not observed at exposure concentrations of 430 ppm. The significance of these findings to human exposure is unclear.

Ethanol:
Inhalation exposure to ethanol vapor at concentrations above applicable workplace exposure levels is expected to produce eye and mucus membrane irritation. Human exposure at concentrations from 1000 to 5000 ppm produced symptoms of narcosis, stupor and unconsciousness. Subjects exposed to ethanol vapor in concentrations between 500 and 10,000 ppm experienced coughing and smarting of the eyes and nose. At 15,000 ppm there was continuous lacrimation and coughing. While extensive acute and chronic effects can be expected with ethanol consumption, ingestion is not expected to be a significant route of exposure to this product.

Butane, all isomers:
Studies in laboratory animals indicate exposure to extremely high levels of butanes (1-10 or higher vol.% in air) may cause cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

n-Hexane:
This material contains n-hexane. Long-term or repeated exposure to n-hexane can cause permanent peripheral nerve damage. Initial symptoms are numbness of the fingers and toes. Also, motor weakness can occur in the digits, but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. Co-exposure to methylethyl ketone or methyl isobutyl ketone increases the neurotoxic properties of n-hexane. In laboratory studies, prolonged exposure to elevated concentrations of n-hexane was associated with decreased sperm count and degenerative changes in the testicles of rats.

Cumene:
Effects from Acute Exposure:
Overexposure to cumene may cause upper respiratory tract irritation and severe CNS depression.

Effects from Prolonged or Repeated Exposure:
Studies in laboratory animals indicate evidence of adverse effects on the kidney and adrenal glands following high level exposure. The relevance of these findings to humans is not clear at this time.

Trimethylbenzenes, all isomers:
Studies of Workers:
Levels of total hydrocarbon vapors present in the breathing atmosphere of these workers ranged from 10 to 60 ppm. The TCLo for humans is 10 ppm, with somnolence and respiratory tract irritation noted.

Studies in Laboratory Animals:
In inhalation studies with rats, four of ten animals died after exposures of 2400 ppm for 24 hours. An oral dose of 5 mL/kg resulted in death in one of ten rats. Minimum lethal intraperitoneal doses were 1.5 to 2.0 mL/kg in rats and 1.13 to 12 mL/kg in guinea pigs. Mesitylene (1, 3, 5 Trimethylbenzene) inhalation at concentrations of 1.5, 3.0, and 6.0 mg/L for six hours was associated with dose-related changes in white blood cell counts in rats. No significant effects on the complete blood count were noted with six hours per day exposure

for five weeks, but elevations of alkaline phosphatase and SGOT were observed. Central nervous system depression and ataxia were noted in rats exposed to 5,100 to 9,180 ppm for two hours.

Benzene:

ORAL (LD50):	Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse].
INHALATION (LC50): (VAPOR):	Acute: 10000 ppm 7 hour(s) [Rat]. 9980 ppm 8 hour(s) [Mouse].

Studies of Workers Over-Exposed to Benzene:
Studies of workers exposed to benzene show clear evidence that over-exposure can cause cancer of the blood forming organs (acute myelogenous leukemia) and aplastic anemia, an often fatal disease. Studies also suggest over-exposure to benzene may be associated with other types of leukemia and other blood disorders. Some studies of workers exposed to benzene have shown an association with increased rates of chromosome aberrations in circulating lymphocytes. One study of women workers exposed to benzene suggested a weak association with irregular menstruation. However, other studies of workers exposed to benzene have not demonstrated clear evidence of an effect on fertility or reproductive outcome in humans. Benzene can cross the placenta and affect the developing fetus. Cases of aplastic anemia have been reported in the offspring of persons severely over-exposed to benzene.

Studies in Laboratory Animals:
Studies in laboratory animals indicate that prolonged, repeated exposure to high levels of benzene vapor can cause bone marrow suppression and cancer in multiple organ systems. Studies in laboratory animals show evidence of adverse effects on male reproductive organs following high levels of exposure but no significant effects on reproduction have been observed. Embryotoxicity has been reported in studies of laboratory animals but effects were limited to reduced fetal weight and skeletal variations.

Ethylbenzene:
Effects from Acute Exposure:
ORAL (LD50), Acute: 3,500 mg/kg [Rat].
DERMAL (LD50), Acute: 17,800 uL/kg [Rabbit].
INTRAPERITONEAL (LD50), Acute: 2,624 mg/kg [Rat].

Effects from Prolonged or Repeated Exposure:
Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). Also, the incidence of tumors was elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as "possibly carcinogenic to humans" (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

Cyclohexane:
Cyclohexane can cause eye, skin and mucous membrane irritation, CNS depressant and narcosis at elevated concentrations. In experimental animals exposed to lethal concentrations by inhalation or oral route, generalized vascular damage and degenerative changes in the heart, lungs, liver, kidneys and brain were identified.

Cyclohexane has been the focus of substantial testing in laboratory animals. Cyclohexane was not found to be genotoxic in several tests including unscheduled DNA synthesis, bacterial and mammalian cell mutation assays, and in vivo chromosomal aberration. An increase in chromosomal aberrations in bone marrow cells of rats exposed to cyclohexane

was reported in the 1980's. However, a careful re-evaluation of slides from this study by the laboratory which conducted the study indicates these findings were in error, and that no significant chromosomal effects were observed in animals exposed to cyclohexane. Findings indicate long-term exposure to cyclohexane does not promote dermal tumorigenesis.

Naphthalene:
Studies in Humans Overexposed to Naphthalene:
Severe jaundice, neurotoxicity (kernicterus) and fatalities have been reported in young children and infants as a result of hemolytic anemia from over-exposure to naphthalene. Persons with Glucose 6-phosphate dehydrogenase (G6PD) deficiency are more prone to the hemolytic effects of naphthalene. Adverse effects on the kidney have also been reported from over-exposure to naphthalene but these effects are believed to be a consequence of hemolytic anemia, and not a direct effect.

Studies in Laboratory Animals:
Hemolytic anemia has been observed in laboratory animals exposed to naphthalene. Laboratory rodents exposed to naphthalene vapor for 2 years (lifetime studies) developed non-neoplastic and neoplastic tumors and inflammatory lesions of the nasal and respiratory tract. Cataracts and other adverse effects on the eye have been observed in laboratory animals exposed to high levels of naphthalene. Findings from a large number of bacterial and mammalian cell mutation assays have been negative. A few studies have shown chromosomal effects (elevated levels of Sister Chromatid Exchange or chromosomal aberrations) *in vitro*.

Styrene:
Neurological injury associated with chronic styrene exposure include distal hypesthesia, decreased nerve conduction velocity, and altered psychomotor performance. These effects did not occur with exposures to airborne concentrations that were less than 100 ppm. Increased deaths from degenerative neurological disorders were found in a comprehensive epidemiological study of Danish reinforced plastics workers. These workers were reported to have a 2.5-fold increased risk for myeloid leukemia with clonal chromosome aberrations. Also, there are several studies that suggest potential reproductive effects in humans and experimental animals from overexposure to styrene. Styrene was not mutagenic in the standard (liquid phase) Ames Salmonella/microsome assay, but was weakly positive when tested in the vapor phase. IARC has listed styrene as possibly carcinogenic to humans (Group 2B).

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Unleaded gasoline is potentially toxic to freshwater and saltwater ecosystems. Various grades of gasoline exhibited range of lethal toxicity (LC_{100}) from 40 PPM to 100 PPM in ambient stream water with Rainbow Trout (*Salmo irideus*). A 24-hour TLm (Median Toxic Limit) was calculated to be 90 PPM with juvenile American Shad (*Squalius cephalus*). In Bluegill Sunfish (*Lepomis macrochirus*), Grey Mullet (*Chelon labrosus*) and Gulf Menhaden (*Brevoortia patronus*), gasoline exhibited a 96-hour LC_{50} of 8 PPM, 2 PPM, and 2 PPM, respectively.

The aquatic toxicity of Methyl tertiary-Butyl Ether (MTBE) is considered to be relatively low. In the crustacean Harpacticoid Copepods (*Nitrocra spinipes*), MTBE exhibited an LC_{50} (96-hour) of 1,000 PPM to 10,000 PPM depending upon various water temperatures. In Bleak Fish (*Alburnus alburnus*), MTBE exhibited an LC_{50} (24-hour) of 1,700 PPM and an LC_{50} (96-hour) of 1,000 PPM at 10° C. In Golden Orfe Fish (*Leuciscus idus melanotus*), MTBE exhibited an LC_{50} (48-hour) of 1,000 PPM and an LC_{100} of 2,000 PPM.

Environmental Fate

Avoid spilling gasoline. Spilled gasoline can result in environmental damage. Spilled gasoline can penetrate soil and contaminate ground water. Although gasoline is biodegradable, it may persist for prolonged time periods, particularly where oxygen levels are reduced. The hydrocarbon components of gasoline are slightly soluble in water. Gasoline hydrocarbon components do not readily dissolve in water but can be adsorbed to soils.

Gasoline contains components that are potentially toxic to freshwater and saltwater ecosystems. It will normally float on water. The components of gasoline will evaporate rapidly. Evaporated hydrocarbon components may contribute to atmospheric smog.

MTBE and other oxygenates are more soluble than other gasoline components. In addition, oxygenates such as MTBE do not adsorb to soils, sediments or suspended particulate matter as readily as other gasoline components. MTBE does not degrade as readily as other gasoline components once in ground water or subsoil. MTBE is not expected to bioconcentrate in the aquatic environment.

SECTION 13. DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Maximize material recovery for reuse or recycling. Recovered non-usable material may be regulated by US EPA as a hazardous waste due to its ignitibility (D001) and/or its toxic (D018) characteristics. Conditions of use may cause this material to become a "hazardous waste", as defined by federal or state regulations. It is the responsibility of the user to determine if the material is a RCRA "hazardous waste" at the time of disposal. Transportation, treatment, storage and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR 260 through 40 CFR 271). State and/or local regulations may be more restrictive. Contact your regional US EPA office for guidance concerning case specfic disposal issues.

SECTION 14. TRANSPORT INFORMATION

The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.

US DOT Status A U.S. Department of Transportation regulated material.

Proper Shipping Name Gasoline, 3, UN 1203, PG II
Gasohol, 3, NA 1203, PGII (Use only for gasoline blended with less than 20% ethanol)

Hazard Class 3 DOT Class: Flammable liquid.

Packing Group(s) II

UN/NA Number UN1203 or NA1203

Reportable Quantity A Reportable Quantity (RQ) has not been established for this material.

Placard(s)

Emergency Response Guide No. 128

MARPOL III Status Not a DOT "Marine Pollutant" per 49 CFR 171.8.

SECTION 15. REGULATORY INFORMATION

TSCA Inventory

This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.

SARA 302/304 Emergency Planning and Notification

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.

SARA 311/312 Hazard Identification

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories:

fire, Acute (Immediate) Health Hazard, Chronic (Delayed) Health Hazard

SARA 313 Toxic Chemical Notification and Release Reporting

This product contains the following components in concentrations above de minimis levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA:
Toluene [CAS No.: 108-88-3] Concentration: <20%
Xylene, all isomers [CAS No.: 1330-20-7] Concentration: <18%
Methyl tertiary-Butyl Ether (MTBE) [CAS No.: 1634-04-4] Concentration: <15%
n-Hexane [CAS No.: 110-54-3] Concentration: <8%
Cumene [CAS No.: 98-82-8] Concentration: <4%
Benzene [CAS No.: 71-43-2] Concentration: <5%
Ethylbenzene [CAS No.: 100-41-4] Concentration: <4%
1, 2, 4 Trimethylbenzene [CAS No.: 95-63-6] Concentration: <4%
Cyclohexane [CAS No.: 110-82-7] Concentration: <3%
Naphthalene [CAS No.: 91-20-3] Concentration: <2%
Styrene [CAS No.: 100-42-5] Concentration: <1%

CERCLA

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are:
Toluene [CAS No.: 108-88-3] RQ = 1000 lbs. (453.6 kg) Concentration: <20%
Xylene, all isomers [CAS No.: 1330-20-7] RQ = 100 lbs. (45.36 kg) Concentration: <18%
Methyl tertiary-Butyl Ether (MTBE) [CAS No.: 1634-04-4] RQ = 1000 lbs. (453.6 kg) Concentration: <15%
n-Hexane [CAS No.: 110-54-3] RQ = 5000 lbs. (2268 kg) Concentration: <8%
2,2,4-Trimethylpentane [CAS No.: 540-84-1] RQ = 1000 lbs. (453.6 kg) Concentration: <5%
Benzene [CAS No.: 71-43-2] RQ = 10 lbs. (4.536 kg) Concentration: <5%
Cumene [CAS No.: 98-82-8] RQ = 5000 lbs. (2268 kg) Concentration: <4%
Ethylbenzene [CAS No.: 100-41-4] RQ = 1000 lbs. (453.6 kg) Concentration: <4%
Cyclohexane [CAS No.: 110-82-7] RQ = 1000 lbs. (453.6 kg) Concentration: <3%
Naphthalene [CAS No.: 91-20-3] RQ = 100 lbs. (45.36 kg) Concentration: <2%
Styrene [CAS No.: 100-42-5] RQ = 1000 lbs. (453.6 kg) Concentration: <1%

Clean Water Act (CWA)

This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.

California Proposition 65

This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Gasoline (Wholly Vaporized and Engine Exhaust), Benzene [CAS No. 71-43-3], Toluene [CAS No. 108-88-3], Ethylbenzene [CAS No.100-41-4] and Naphthalene [CAS No.91-20-3]

New Jersey Right-to-Know Label

Gasoline [NJDEP CAS No. 8006-61-9]

Additional Regulatory Remarks

As minimum requirements, CITGO recommends that the following advisory information be displayed on equipment used to dispense gasoline in motor vehicles. Additional warnings specified by various regulatory authorities may be required: "DANGER: Extremely Flammable. Use as a Motor Fuel Only. No Smoking. Stop Engine. Turn Off All Electronic Equipment including Cellular Telephones. Do Not Overfill Tank. Keep Away from Heat and Flames. Do Not leave nozzle unattended during refueling. **Static Sparks Can Cause a Fire, especially when filling portable containers.** Containers must be metal or other material approved for storing gasoline. PLACE CONTAINER ON GROUND. DO NOT FILL ANY PORTABLE CONTAINER IN OR ON A VEHICLE. Keep nozzle spout in contact with the container during the entire filling operation. **Harmful or Fatal if Swallowed. Long-Exposure Has Caused Cancer in Laboratory Animals.** Avoid prolonged breathing of vapors. Keep face away from nozzle and gas tank. Never siphon by mouth."

WHMIS Class B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
WHMIS Class D-2B: Material causing other toxic effects (TOXIC).

SECTION 16. OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

REVISION INFORMATION

Version Number	7.0
Revision Date	05/23/2005
Print Date	Printed on 05/23/2005.

ABBREVIATIONS

AP: Approximately EQ: Equal >: Greater Than <: Less Than NA: Not Applicable ND: No Data NE: Not Established

ACGIH: American Conference of Governmental Industrial Hygienists
AIHA: American Industrial Hygiene Association
IARC: International Agency for Research on Cancer
NTP: National Toxicology Program
NIOSH: National Institute of Occupational Safety and Health
OSHA: Occupational Safety and Health Administration
NPCA: National Paint and Coating Manufacturers Association
HMIS: Hazardous Materials Information System
NFPA: National Fire Protection Association
EPA: US Environmental Protection Agency

DISCLAIMER OF LIABILITY

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THE CONDITIONS OR METHODS OF HANDLING, STORAGE, USE, AND DISPOSAL OF THE PRODUCT ARE BEYOND OUR CONTROL AND MAY BE BEYOND OUR KNOWLEDGE. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.

***** END OF MSDS *****

CITGO No. 1 Diesel Fuel, All Grades

Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210

MSDS No. AG1DF
Revision Date 5/31/2006

IMPORTANT: This MSDS is prepared in accordance with 29 CFR 1910.1200. Read this MSDS before transporting, handling, storing or disposing of this product and forward this information to employees, customers and users of this product.

Hazard Rankings

	HMIS	NFPA
Health Hazard	* 1	0
Fire Hazard	2	2
Reactivity	0	0

* = Chronic Health Hazard

Emergency Overview

Physical State Liquid.
Color Clear to light amber. **Odor** Characteristic, kerosene-like.

WARNING!
Combustible liquid; vapor may cause flash fire.
Harmful or fatal if swallowed - can enter lungs and cause damage.
Mist or vapor can irritate the respiratory tract.
Liquid contact can cause eye or skin irritation.
May be harmful if inhaled or absorbed through the skin.
Overexposure can cause central nervous system (CNS) depression and/or other target organ effects.
Diesel engine exhaust can cause upper respiratory tract irritation and reversible pulmonary effects.
Spills may create a slipping hazard.

Protective Equipment

Minimum Recommended
See Section 8 for Details

SECTION 1. PRODUCT IDENTIFICATION

Trade Name	CITGO No. 1 Diesel Fuel, All Grades	**Technical Contact**	(832) 486-5940 or (918) 495-5939
Product Number	Various	**Medical Emergency**	(832) 486-4700
CAS Number	8008-20-6	**CHEMTREC Emergency (United States Only)**	(800) 424-9300
Product Family	Fuels.		
Synonyms	None		

SECTION 2. COMPOSITION

This product may be composed, in whole or in part, of any of the following refinery streams:

Kerosene [CAS No.: 8008-20-6]
Hydrodesulfurized Kerosine (Petroleum) [CAS No.: 64742-81-0]
Hydrodesulfurized Middle Distillate (petroleum) [CAS No.: 64742-80-9]
Straight-run Middle Distillate (Petroleum) [CAS No.: 64741-44-2]
Hydrodesulfurized Light Catalytic Cracked Distillate (Petroleum) [CAS No.: 68333-25-5]
Light Catalytic Cracked Distillate (Petroleum) [CAS No.: 64741-59-9]

This product contains the following chemical components:

Component Name(s)	CAS Registry No.	Concentration (%)

 Continued on Next Page

Nonane, all isomers	Mixture.	20 - 30
Ethylmethylbenzenes (Ethyltoluenes)	25550-14-5	1 - 3
Naphthalene	91-20-3	0 - 3
Trimethylbenzenes, all isomers	25551-13-7	0 - 2
Biphenyl (Diphenyl)	92-52-4	0 - 2
Ethylbenzene	100-41-4	0 - 1
Xylene, all isomers	1330-20-7	0 - 1
1, 2, 4 Trimethylbenzene	95-63-6	0 - 1
Cumene	98-82-8	0 - 1

SECTION 3. HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

Major Route(s) of Entry Skin contact. Eye contact. Inhalation.

Signs and Symptoms of Acute Exposure

Inhalation

Breathing mist or vapors concentrations well above occupational exposure levels can irritate the mucous membranes of the nose, throat, bronchi, and lungs and can cause transient central nervous system (CNS) depression. Signs and symptoms of CNS depression include headache, dizziness, nausea, blurred vision, slurred speech, flushed face, confusion, weakness, fatigue or loss of consciousness depending upon the concentration and/or duration of exposure. In severe cases, overexposure by inhalation can cause convulsions, coma, or death.

Eye Contact

This product can cause eye irritation with short-term contact with liquid, mists or vapor. Symptoms include stinging, watering, redness, and swelling. In severe cases, permanent eye damage can result.

Skin Contact

Animal test results on similar materials suggest that this product can cause moderate to severe skin irritation. Symptoms include redness, itching, and burning of the skin. Also, certain components of this material may be absorbed through the skin and produce CNS depression effects (see "Inhalation" above). If the skin is damaged, absorption increases. Prolonged and/or repeated contact may cause severe dermatitis and/or more serious skin disorders. Chronic symptoms may include drying, swelling, scaling, blistering, cracking, and/or severe tissue damage.

Ingestion

If swallowed, this material may irritate the mouth, throat, and esophagus. It can be absorbed into the blood stream through the stomach and intestinal tract. Symptoms may include a burning sensation of the mouth and esophagus, nausea and vomiting. In addition, it can cause central nervous system effects characterized by dizziness, staggering, drowsiness, delirium and/or loss of consciousness.

Because of the low viscosity, this material can enter the lungs directly by aspiration during swallowing or subsequent vomiting. Aspiration of a small amount of liquid can cause severe lung damage and/or death.

Chronic Health Effects Summary

Secondary effects of ingestion and subsequent aspiration into the lungs may cause pneumatocele (lung cavity) formation and chronic lung dysfunction.

This product contains petroleum middle distillates similar to those shown to produce skin tumors on laboratory rodents following repeated application. All tumors appeared during the latter portion of the typical 2-year lifespan of the animals. Certain studies have shown that washing the exposed skin of the test animal with soap and water between treatments greatly reduces the potential tumorigenic effects. These data suggest that good personal hygiene is effective in reducing the risk of this potential adverse health effect.

This material and/or its components have been associated with developmental toxicity, reproductive toxicity, genotoxicity, immunotoxicity, and/or carcinogenicity. Refer to Section 11 of this MSDS for additional health-related information.

Conditions Aggravated by Exposure

Medical conditions aggravated by exposure to this material may include skin disorders, chronic respiratory diseases, neurological conditions, liver or kidney dysfunction.

Target Organs May cause damage to the following organs: kidneys, liver, upper respiratory tract, skin, eyes, central nervous system (CNS).

Carcinogenic Potential This material contains ethylbenzene and naphthalene at concentrations at or above 0.1%. Ethylbenzene is considered possibly carcinogenic to humans by IARC. (See Section 11.) NTP has determined that exposure to diesel exhaust particulates, a complex mixture of combustion products of diesel fuel, is reasonably anticipated to be a human carcinogen.

OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

OSHA Health Hazard Classification				OSHA Physical Hazard Classification					
Irritant	X	Sensitizer		Combustible	X	Explosive		Pyrophoric	
Toxic		Highly Toxic		Flammable		Oxidizer		Water-reactive	
Corrosive		Carcinogenic		Compressed Gas		Organic Peroxide		Unstable	

SECTION 4. FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Inhalation Move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately. Keep the affected individual warm and at rest.

Eye Contact Check for and remove contact lenses. Flush eyes with cool, clean, low-pressure water for at least 15 minutes while occasionally lifting and lowering eyelids. Do not use eye ointment unless directed to by a physician. Seek medical attention if excessive tearing, irritation, or pain persists.

Skin Contact Remove contaminated shoes and clothing. Flush affected area with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. Do not use ointments. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists.

Ingestion Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Never give anything by mouth to a person who is not fully conscious. Do not leave victim unattended. Seek medical attention immediately.

Notes to Physician Inhalation overexposure can produce toxic effects. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Vigorous anti-inflammatory/steroid treatment may be required at first evidence of upper airway or pulmonary edema. Administer 100 percent humidified supplemental oxygen with assisted ventilation, as required.

If ingested, this material presents a significant aspiration/lipoid or chemical pneumonitis hazard. As a result, induction of emesis is not recommended. Consider administration of an aqueous slurry of activated charcoal followed by a cathartic such as magnesium citrate or sorbitol. Also, treatment may involve careful gastric lavage if performed soon after ingestion or in patients who are comatose or at risk of convulsing. Protect the airway by placement in Trendelenburg and left lateral decubitus position or by cuffed endotracheal intubation. If vital signs become abnormal or symptoms develop, obtain a chest x-ray and liver function tests. Antibiotics are indicated if pulmonary bacterial infection occurs. Monitor for cardiac function and arterial blood gases in severe exposure cases.

 Continued on Next Page

SECTION 5. FIRE FIGHTING MEASURES

NFPA Flammability Classification	NFPA Class-II combustible liquid.
Flash Point	Closed cup: 38°C (100°F). (Pensky-Martens. (Minimum))
Lower Flammable Limit	AP 0.7 % **Upper Flammable Limit** AP 5 %
Autoignition Temperature	>254°C (489.2°F)
Hazardous Combustion Products	Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons and oxides of sulfur and/or nitrogen.
Special Properties	Combustible Liquid! This material releases vapors when heated above ambient temperatures. Vapors can cause a flash fire. Vapors can travel to a source of ignition and flashback. A vapor and air mixture can create an explosion hazard in confined spaces such as sewers. Use only with adequate ventilation. If container is not properly cooled, it can rupture in the heat of a fire.
Extinguishing Media	SMALL FIRE: Use dry chemicals, carbon dioxide, foam, water fog, or inert gas (nitrogen). LARGE FIRE: Use foam, water fog, or water spray. Water fog and spray are effective in cooling containers and adjacent structures. However, water can cause frothing and/or may not extinguish the fire. Water can be used to cool the external walls of vessels to prevent excessive pressure, autoignition or explosion. DO NOT use a solid stream of water directly on the fire as the water may spread the fire to a larger area.
Protection of Fire Fighters	Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles. Cover pooling liquid with foam. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines. Be aware that burning liquid will float on water. Notify appropriate authorities of potential fire and explosion hazard if liquid enter sewers or waterways.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Combustible Liquid! Release can result in a fire hazard. Evacuate all non-essential personnel from release area. Establish a regulated zone with site control and security. Eliminate all ignition sources. Stop the leak if it can done without risk. A vapor-suppressing foam may be used to reduce vapors. Properly bond or ground all equipment used when handling this material. Avoid skin contact. Do not walk through spilled material. Verify that responders are properly trained and wearing appropriate personnel protective equipment. Dike far ahead of a liquid spills. Do not allow released material to entry waterways, sewers, basements, or confined areas. This material will float on water. Absorb or cover with dry earth, sand or other non-combustible material. Use clean, non-sparking tools to collect absorbed material. Place spent sorbent materials, free liquids and other clean-up debris into proper waste containers for appropriate disposal. Certain releases must be reported to the National Response Center (800/424-8802) and state or regulatory authorities. Comply with all laws and regulations.

SECTION 7. HANDLING AND STORAGE

Handling

Combustible Liquid!
A static electrical charge can accumulate when this material is flowing through pipes, nozzles or filters and when it is agitated. A static spark discharge can ignite accumulated vapors particularly during dry weather conditions. Always bond receiving containers to the fill pipe before and during loading. Always keep nozzle in contact with the container throughout the loading process. Do not fill any portable container in or on a vehicle. Special precautions, such as reduced loading rates and increased monitoring, must be observed during "switch loading" operations (i.e., loading this material in tanks or shipping compartments that previously containing gasoline or similar low flash point products).

Fire hazard increases as product temperature approaches its flash point. Keep container closed and drum bungs in place. Remove spillage immediately from walking areas. Do not handle or store near heat, sparks or other potential ignition sources. Do not handle or store with oxidizing agents. Avoid breathing mist or vapor. Never siphon by mouth. Do not taste or swallow. Avoid contact with eyes, skin and clothing. Use gloves constructed of impervious materials and protective clothing if direct contact is anticipated. Provide ventilation to maintain exposure potential below applicable exposure levels. Avoid water contamination. Wash thoroughly after handling. Prevent contact with food or tobacco products.

When performing repairs and maintenance on contaminated equipment, keep unnecessary persons from hazard area. Eliminate heat, flame and other potential ignition sources. Drain and purge equipment, as necessary, to remove material residues. Remove contaminated clothing. Wash exposed skin thoroughly with soap and water after handling.

Storage

Store in a cool, dry, well-ventilated place. Keep containers tightly closed. Do not store this product near heat, flame or other potential ignition sources. Do not store with oxidizers. Do not store this product in unlabeled containers. Do not puncture or incinerate containers. Ground all equipment containing this material. All electrical equipment in areas where this material is stored or handled must meet all applicable requirements of the NFPA's National Electrical Code (NEC). Store and transport in accordance with all applicable laws.

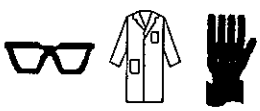
SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

Provide ventilation or other engineering controls to keep the airborne concentrations of vapor or mists below the applicable workplace exposure limits indicated below. All electrical equipment should comply with the National Electric Code. An emergency eye wash station and safety shower should be located near the work-station.

Personal Protective Equipment

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.



Eye Protection

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

Hand Protection

Avoid skin contact. Use heavy duty gloves constructed of chemical resistant materials such as Viton® or heavy nitrile rubber. Wash hands with plenty of mild soap and water before eating, drinking, smoking, use of toilet facilities or leaving work. DO NOT use gasoline, kerosene, solvents or harsh abrasives as skin cleaners.

Body Protection Avoid skin contact. Wear long-sleeved fire-retardant garments (e.g., Nomex®) while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, boots and additional facial protection. If product comes in contact with clothing, immediately remove soaked clothing and shower. Promptly remove and discarded contaminated leather goods.

Respiratory Protection Airborne concentration will determine the level of respiratiory protection required. Respiratory protection is normally not required unless the product is heated or misted. For known or anticipated vapor or mist concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator equipped with a dust/mist prefilter if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134).

General Comments Warning! Use of this material in spaces without adequate ventilation may result in generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels
Nonane, all isomers	**ACGIH (United States).** TWA: 200 ppm 8 hour(s).
Ethylmethylbenzene, all isomers	Not available.
Naphthalene	**ACGIH (United States). Skin** TWA: 10 ppm 8 hour(s). STEL: 15 ppm 15 minute(s). **OSHA (United States).** TWA: 10 ppm 8 hour(s).
Trimethylbenzenes, all isomers	**ACGIH (United States).** TWA: 25 ppm 8 hour(s).
Biphenyl (Diphenyl)	**ACGIH TLV (United States).** TWA: 0.2 ppm 8 hour(s). **OSHA PEL Z2 (United States).** TWA: 0.2 ppm 8 hour(s).
Ethylbenzene	**ACGIH (United States).** TWA: 100 ppm 8 hour(s). STEL: 125 ppm 15 minute(s). **OSHA (United States).** TWA: 100 ppm 8 hour(s).
Xylene, all isomers	**ACGIH (United States).** TWA: 100 ppm 8 hour(s). STEL: 150 ppm 15 minute(s). **OSHA (United States).** TWA: 100 ppm 8 hour(s).
1, 2, 4 Trimethylbenzene	Not available.
Cumene	**ACGIH (United States).** TWA: 50 ppm 8 hour(s). **OSHA (United States). Skin** TWA: 50 ppm 8 hour(s).
Sulfur	**ACGIH (United States, 1996).** TWA: 2 ppm STEL: 5 ppm **OSHA (United States).** TWA: 5 ppm **NIOSH** TWA: 2 ppm STEL: 5 ppm
Diesel exhaust particulate	**ACGIH (United States, 2001).**

 Continued on Next Page

Toluene	TWA: 0.05 mg/m^3 **ACGIH (United States). Skin** TWA: 50 ppm 8 hour(s). **OSHA (United States).** TWA: 200 ppm 8 hour(s). CEIL: 300 ppm PEAK: 500 ppm
Benzene	**ACGIH (United States). Skin** TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s). **OSHA (United States). Skin Notes: See Table Z-2 for exclusions in 20 CFR 1910.1028 to the PEL.** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s).
Middle distillates, petroleum	Not available.
Kerosene	**NIOSH REL (United States).** TWA: 100 mg/m^3 8 hour(s).
Hydrodesulfurized Kerosine (Petroleum)	Not available.
Hydrodesulfurized middle distillate (petroleum)	Not available.
Straight-run middle distillate (petroleum)	**ACGIH (United States, 1998). Skin** TWA: 100 mg/m^3
Distillates, petroleum, hydrodesulfurized light catalytic cracked	Not available.
Distillates, petroleum, light catalytic cracked	Not available.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)

Physical State	Liquid.	**Color**	Clear to light amber.	**Odor**	Characteristic, kerosene-like.
Specific Gravity	0.82 (Water = 1)	**pH**	Not Applicable.	**Vapor Density**	4 (Air = 1)
Boiling Range	AP 150° C (AP 302° F)			**Melting/Freezing Point**	Not available.
Vapor Pressure	<0.3 kPa (<2 mm Hg) (at 20°C)			**Volatility**	AP 825 g/l VOC (W%) (ASTM D2369) =
Solubility in Water	Very slightly soluble in cold water.			**Viscosity (cSt @ 40°C)**	AP 3
Flash Point	Closed cup: 38°C (100°F). (Pensky-Martens. (Minimum))				
Additional Properties	Density = AP 6.8 lbs/gal.; Viscosity (ASTM D2161) = 30 - 40 SUS @ 100° F				

SECTION 10. STABILITY AND REACTIVITY

Chemical Stability	Stable.	**Hazardous Polymerization**	Not expected to occur.
Conditions to Avoid	Keep away from heat, flame and other potential ignition sources. Keep away from strong oxidizing conditions and agents.		
Materials Incompatibility	Strong acids, alkalies, and oxidizers such as liquid chlorine, other halogens, hydrogen peroxide and oxygen.		
Hazardous Decomposition Products	No additional hazardous decomposition products were identified other than the combustion products identified in Section 5 of this MSDS.		

SECTION 11. TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

Toxicity Data

Naphthalene
Studies in Humans Overexposed to Naphthalene:
Severe jaundice, neurotoxicity (kernicterus) and fatalities have been reported in young children and infants as a result of hemolytic anemia from over-exposure to naphthalene. Persons with Glucose 6-phosphate dehydrogenase (G6PD) deficiency are more prone to the hemolytic effects of naphthalene. Adverse effects on the kidney have also been reported from over-exposure to naphthalene but these effects are believed to be a consequence of hemolytic anemia, and not a direct effect.

Studies in Laboratory Animals:
Hemolytic anemia has been observed in laboratory animals exposed to naphthalene. Laboratory rodents exposed to naphthalene vapor for 2 years (lifetime studies) developed non-neoplastic and neoplastic tumors and inflammatory lesions of the nasal and respiratory tract. Cataracts and other adverse effects on the eye have been observed in laboratory animals exposed to high levels of naphthalene. Findings from a large number of bacterial and mammalian cell mutation assays have been negative. A few studies have shown chromosomal effects (elevated levels of Sister Chromatid Exchange or chromosomal aberrations) *in vitro*.

Trimethylbenzenes, all isomers
Studies of Workers:
Levels of total hydrocarbon vapors present in the breathing atmosphere of these workers ranged from 10 to 60 ppm. The TCLo for humans is 10 ppm, with somnolence and respiratory tract irritation noted.

Studies in Laboratory Animals:
In inhalation studies with rats, four of ten animals died after exposures of 2400 ppm for 24 hours. An oral dose of 5 mL/kg resulted in death in one of ten rats. Minimum lethal intraperitoneal doses were 1.5 to 2.0 mL/kg in rats and 1.13 to 12 mL/kg in guinea pigs. Mesitylene (1, 3, 5 Trimethylbenzene) inhalation at concentrations of 1.5, 3.0, and 6.0 mg/L for six hours was associated with dose-related changes in white blood cell counts in rats. No significant effects on the complete blood count were noted with six hours per day exposure for five weeks, but elevations of alkaline phosphatase and SGOT were observed. Central nervous system depression and ataxia were noted in rats exposed to 5,100 to 9,180 ppm for two hours.

Biphenyl (Diphenyl)
Studies in Humans Overexposed to Biphenyl:
Evidence of adverse effects on the liver and the nervous system have been described in studies of workers exposed to high levels for prolonged periods.

Studies in Laboratory Animals:
Evidence of adverse effects on the kidney and liver, and changes in whole blood (reduced hematocrit and hemoglobin levels) have been observed in laboratory rodents following subchronic exposure to biphenyl.

Genotoxicity & Carcinogenicity:
Biphenyl tested negative in bacteriological systems but some evidence of positive responses have been reported in mammalian cell systems in the presence of metabolic activation. The EPA has determined human and animal data are inadequate to classify the carcinogenic potential of biphenyl.

Ethylbenzene
Effects from Acute Exposure:
ORAL (LD50), Acute: 3,500 mg/kg [Rat].

 Continued on Next Page

DERMAL (LD50), Acute: 17,800 uL/kg [Rabbit].
INTRAPERITONEAL (LD50), Acute: 2,624 mg/kg [Rat].

Effects from Prolonged or Repeated Exposure:
Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). Also, the incidence of tumors was elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as "possibly carcinogenic to humans" (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

Diesel exhaust particulate
Lung tumor and lymphomas were identified in rats and mice exposed to unfiltered diesel fuel exhaust in chronic inhalation studies. Further, epidemiological studies have identified increase incidences of lung cancer in US railroad workers and bladder cancer in bus and truck drivers possibly associated with exposure to diesel engine exhaust. NTP has determined that exposure to diesel exhaust particulates, a complex mixture of combustion products of diesel fuel, is reasonably anticipated to be a human carcinogen. In addition, NIOSH has identified complete diesel exhaust as a potential carcinogen.

Hydrodesulfurized middle distillate (petroleum)
INHALATION LC50, Acute: 4.6 to 7.64 mg/L for four hours [Rat] - Dyspnea, nasal discharge, alopecia and excessive salivation.
ORAL LD50, Acute >500 g/kg [Rat Screening Level] Diarrhea, hyperactivity, ptosis and somnolence.
DERMAL LD50, Acute: >2,000 mg/kg [Rabbit Screening Level]
BUEHLER DERMAL, Acute: Non-sensitizing [Guinea Pig].
14-Day DERMAL, Subchronic: 0.05 ml/kg applied 3 times per week [Mouse, Human skin grafted to Athymic nude Mice] - Irritation and epidermal hyperplasia.
62-Week DERMAL, Chronic: 0.05 ml/kg applied 3 times per week [Mouse] - Extreme skin irritation; moderate increase in contact-point skin tumors.

Straight-run middle distillate (petroleum)
INHALATION, LC50, Acute: 1.72 mg/L for four hours [Male Rat].
INHALATION, LC50, Acute: 1.82 mg/L for 4 hours [Female Rat].
ORAL, LD50, Acute: >5,000 mg/kg [Rat screening level] - Diarrhea, hypoactivity and somnolence.
DERMAL, LD50, Acute: >2,000 mg/kg [Rabbit screen].
BUEHLER DERMAL, Acute: Non-sensitizing [Guinea Pig].
28-Day DERMAL, Subchronic: Moderate irritation at 200 to 2,000 mg/kg with no other treatment-related clinical effects observed.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Freshwater Toxicity:
Concentration: 2400 ppm Exposure: 48 hrs. Species: Juven. Am. Shad (*Squalius cephalus*) Effect: TLM
Concentration: >127 ppm Exposure: 96 hrs. Species: Bluegill (*Lepomis macrochirus*) Effect: LC50

Saltwater Toxicity
Concentration: 10 ppm Exposure: 96 hrs. Species: Menhaden (*Brevoortia patronus*) Effect: LC50
Concentration: 10 ppm Exposure: 96 hrs. Species: Grass Shrimp Effect: LC50

Environmental Fate

If spilled, this material will normally evaporate. Hydrocarbon components may contribute to atmospheric smog. If released to the subsoils, petroleum middle distillate fuels will strongly adsorb to soils. Groundwater should be considered as an exposure pathway. Liquid and vapor can migrate through the subsurface and preferential pathways (such as utility line backfill) to downgradient receptors.

Middle distillates are potentially toxic to freshwater and saltwater ecosystems. Distillate fuels will normally float on water. In stagnant or slow-flowing waterways, a hydrocarbon layer can cover a large surface area. As a result, this oil layer can limit or eliminate natural atmospheric oxygen transport into the water. With time, if not removed, oxygen depletion in the waterway can cause a fish kill or create an anaerobic environment. Also, this coating action can also kill plankton, algae, and water birds.

SECTION 13. DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Maximize material recovery for reuse or recycling. If spilled material is introduced into a wastewater treatment system, chemical and biological oxygen demand (COD and BOD) will likely increase. Vapor emissions from a bio-oxidation process contaminated with this material might be a potential health hazard.

Recovered non-usable material may be regulated by US EPA as a hazardous waste due to its ignitibility characteristic (D001). In addition, conditions of use may cause this material to become a hazardous waste, as defined by Federal or State regulations. It is the responsibility of the user to determine if the material is a hazardous waste at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR Parts 260 through 271). Contact your regional US EPA office for guidance concerning case specific disposal issues. State and/or local regulations might be even more restrictive.

SECTION 14. TRANSPORT INFORMATION

The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.

US DOT Status

A U.S. Department of Transportation (DOT) regulated material. The following U. S. DOT hazardous materials shipping description applies to bulk packaged material that is transported by highway or rail. Alternate shipping descriptions may be required for product transported by marine vessel, air or other method and for non-bulk packaged material.

Proper Shipping Name Diesel Fuel, No. 1, Combustible liquid, NA1993, PG III

Hazard Class DOT Class: Combustible liquid with a flash point greater than 37.8°C (100°F).

Packing Group(s) III

UN/NA Number NA 1993 or UN 1202

Reportable Quantity A Reportable Quantity (RQ) has not been established for this material.

Placard(s)

Emergency Response Guide No. 128

MARPOL III Status Not a DOT "Marine Pollutant" per 49 CFR 171.8.

SECTION 15. REGULATORY INFORMATION

TSCA Inventory	This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.
SARA 302/304 Emergency Planning and Notification	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.
SARA 311/312 Hazard Identification	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories: fire, Acute (Immediate) Health Hazard, Chronic (Delayed) Health Hazard
SARA 313 Toxic Chemical Notification and Release Reporting	This product contains the following components in concentrations above *de minimis* levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA: Naphthalene [CAS No.: 91-20-3] Concentration: 1.5% Biphenyl (Diphenyl) [CAS No.: 92-52-4] Concentration: 1% Ethylbenzene [CAS No.: 100-41-4] Concentration: 0.5%
CERCLA	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are: Naphthalene [CAS No.: 91-20-3] RQ = 100 lbs. (45.36 kg) Concentration: 1.5% Ethylbenzene [CAS No.: 100-41-4] RQ = 1000 lbs. (453.6 kg) Concentration: 0.5% Xylene, all isomers [CAS No.: 1330-20-7] RQ = 100 lbs. (45.36 kg) Concentration: 0.5% Cumene [CAS No.: 98-82-8] RQ = 5000 lbs. (2268 kg) Concentration: 0.5% Benzene [CAS No.: 71-43-2] RQ = 10 lbs. (4.536 kg) Concentration: 0.045%
Clean Water Act (CWA)	This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.
California Proposition 65	This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Naphthalene: 1.5% Ethylbenzene: 0.5% Diesel exhaust particulate Toluene: 0.045% Benzene: 0.045%
New Jersey Right-to-Know Label	Diesel Fuel
Additional Remarks	Federal Hazardous Substances Act, related statutes, and Consumer Product Safety Commission regulations, as defined by 16 CFR 1500.14(b)(3) and 1500.83(a)(13): This product contains "Petroleum Distillates" which may require special labeling if distributed in a manner intended or packaged in a form suitable for use in the household or by children. Precautionary label dialogue should display the following: **DANGER: Contains Petroleum Distillates! Harmful or fatal if swallowed! Call Physician Immediately. KEEP OUT OF REACH OF CHILDREN!**

SECTION 16. OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

REVISION INFORMATION

Version Number	2.0
Revision Date	5/31/2006
Print Date	Printed on 5/31/2006.

ABBREVIATIONS

AP: Approximately EQ: Equal >: Greater Than <: Less Than NA: Not Applicable ND: No Data NE: Not Establishe

ACGIH: American Conference of Governmental Industrial Hygienist

AIHA: American Industrial Hygiene Associatior

IARC: International Agency for Research on Cancer

NTP: National Toxicology Program

NIOSH: National Institute of Occupational Safety and Health

OSHA: Occupational Safety and Health Administration

NPCA: National Paint and Coating Manufacturers Association

HMIS: Hazardous Materials Information System

NFPA: National Fire Protection Association

EPA: US Environmental Protection Agency

DISCLAIMER OF LIABILITY

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***** END OF MSDS *****

APPENDIX B
SPECIFIC HEALTH AND SAFETY PROCEDURES

<u>ON CD ONLY</u>

NOTE: **Health and safety procedures that will be utilized during the project are listed below. A copy of all the Health and Safety Procedures (HS001-999) is available on the Intranet (Insider).**

HS020	Accident Prevention Program: Reporting Investigation and Review
HS021	Accident Prevention Program: Management Safety Reviews
HS045	Job Safety Analysis
HS051	Tailgate Safety Meeting
HS060	Hazard Communication Program
HS303	Pressurized Cleaning and Cutting Equipment
HS 307	Excavation and Trenching
HS308	Underground/Overhead Utility Contact Prevention
HS 315	Control of Hazardous Energy Sources
HS400	Working in Hot Environments
HS401	Cold Stress
HS402	Hearing Conservation
HS600	Personal Protection Program
HS601	Respiratory Protection
HS800	Motor Vehicle Operation: General Requirements

PROCEDURE

Subject: SAFETY

1.0 PURPOSE AND SUMMARY

The Shaw Group is firmly committed to operating all of its facilities and projects in a safe, efficient manner and in compliance with all applicable safety, health and environmental regulations. Our goal is to provide an injury free work environment where facilities and projects are free of recognized hazards; and people, equipment and the environment are not placed at unreasonable risk of injury or damage.

The most valuable resource we have is our people. While quality and productivity are critical to our operations, they will never take precedence over the safety of personnel or protection of the environment.

To accomplish our goals, requires a unified team effort from all levels of the organization. Safety must be planned into all of our activities and receive the same level of attention as quality and productivity.

The Environmental, Health & Safety Program Manual has been developed to guide us in our daily activities. Teamwork and compliance with our safety standards, procedures and rules will help us achieve our goal of an injury free work environment. Your cooperation and active participation in The Shaw Group's safety process is expected and appreciated, anything less is unacceptable.

Uncontrolled when printed

J.M. Bernhard, Jr.
Chairman, President and Chief Executive Officer
The Shaw Group Inc.

PROCEDURE

Subject: ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the requirements for incident reporting, investigation, and review. This procedure is an integral part of the company's overall accident prevention program and aids in the identification of potential causal factors and corrective actions. Key elements of this procedure include:

- **All occupational injuries/illnesses, vehicle accidents, and near miss incidents must be promptly reported and investigated.**

- All Occupational Safety and Health Administration (OSHA) recordable injuries/illnesses and chargeable vehicle accidents must be reviewed by an Accident Review Board. The Accident Review Board report is submitted to the Baton Rouge Corporate Safety Department, for production to and retention on behalf of the Legal Department.

- All incidents involving a fatality, major injury/illness, or resulting in significant property damage will be immediately reported to: the business line Health & Safety Manager; the Corporate Health and Safety Department; Business Line Vice President and the Legal Department.

- All investigations and associated materials obtained and/or produced, in association with OSHA recordable injuries/illnesses, chargeable vehicle accidents, fatalities, major injury/illness, or incidents resulting in significant property damage, are to be performed for & on behalf of the legal department and will be subject to being classified as Confidential Attorney-Client / Attorney Work Product.

- All business line Health & Safety Managers are required to prepare a Monthly Loss Report summarizing all current month, and year-to date, chargeable vehicle accidents, injury/illness cases (requiring outside medical care), lost work day totals and restricted work day totals. This report shall then be forwarded, by the 10th day of the following month, to the Baton Rouge Corporate Safety Office.

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Not Controlled When Printed

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Corporate Health & Safety Department 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 company owned, leased or rented vehicles are involved and damage exceeds $2,500.00.

- When an employee is driving a personal vehicle while on company business and damage exceeds $2,500.00.

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

Days Away From Work - Days away from work are the number of **calendar** days following the injury or illness, excluding the date of the injury.

Job Safety Analysis (JSA) – The JSA is an effective management technique for identifying hazardous conditions and unsafe acts in the workplace. A JSA is intended to analyze the individual steps or activities, which together create a job or specific work duty, and to detect any actual or potential hazards that may be present. (See HS045: Job Safety Analysis)

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Restricted Work – Occurs when, as the result of a work-related injury or illness:

- A physician or other licensed health care professional recommends that the employee not perform one or more of the routine functions of his or her job, or not work the full workday that he or she would otherwise have been scheduled to work

Near Miss Incident - Any incident where no injury occurred, but where the potential for injury existed.

OSHA Recordable Case – See Attachment 8

Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. For the purpose of this procedure, off-road vehicles such as earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles. (See HS800 Motor Vehicle Operation: General Requirements)

5.0 TEXT

5.1 Incident Reporting Process

Employees are required to immediately report to their direct supervisor all occupational injuries, illnesses, accidents and near miss incidents having the potential for injury. Site Business Line Managers or Supervisors (supervisor directly responsible for the employee involved in the incident) with first-hand knowledge of an incident is required to:

- Immediately arrange for appropriate medical attention and notify the responsible health and safety representative.
- **As soon as practical, but not longer than one hour after gaining knowledge of the occurrence**, notify the Shaw Notification Hotline/Helpdesk by calling 1-866-299-3445 (Attachment 10) of any injury requiring off-site medical treatment, any chargeable vehicle accident or equipment incident involving property damage exceeding $2,500 in value (Shaw or third party).
- Inform Health Resources of all incidents requiring off-site medical attention by calling 1-800-350-4511. This call should be made **prior** to transporting the employee such that they can coordinate physicians services prior to arrival of the employee to the clinic, and provide the following information:
  - Company Name (Shaw E&I) & Business Line (e.g. DOD, Commercial)
  - Employee Name
  - Name of anticipated, treating medical facility and phone number
  - Brief description of incident.

  Health Resource's role is to interface with the treating physician, to ensure that appropriate care is provided to the injured employee.

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- Complete the *Authorization for Treatment, Release of Medical Information*, and *Return to Work* (Attachment 9A, 9B, 9C) and the *Supervisor's Employee Injury Report* (Attachment 2) for all cases requiring off-site medical attention. The Site Safety and Health Representative or responsible supervisor shall ensure that the forms are completed and faxed to Health Resources at (800) 853-2641 prior to leaving the medical facility or as soon as reasonably possible.

- Post accident drug and alcohol testing shall occur in accordance with HS101 Drug and Alcohol Testing, immediately following an incident.

  NOTE: Prior to performing non-DOT post accident testing, it is the responsibility of the employee's supervisor to ensure that Health Resources has verified that this testing is not prohibited or restricted by state or local regulations.

- Prior to an injured employee returning to his/her job duties, a follow-up call by Health Resources will be made to the project site. The purpose of this call is to ensure work restrictions are clarified and planned work activities are consistent with medical recommendations.

- The Supervisor shall initiate/complete the appropriate company documentation in accordance with the following incident classifications: (note: if a Site Safety and Health Representative is on site, he should work in concert with the supervisor)

  - OSHA Recordable Cases
    a. Supervisor's Employee Injury/Illness Report (Attachment 2)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement Form (Attachment 6)
    d. Accident Review Board (Attachment 7)

  - First Aid Cases
    a. Supervisor's Employee Injury/Illness Report (Attachment 2)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement Form (Attachment 6)

  - Chargeable Vehicle Accidents
    a. Vehicle Accident Report (Attachment 3)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement (Attachment 6)
    d. Accident Review Board (Attachment 7)
    e. Driving Record Certification (Procedure HS800)

  - Non-Chargeable Vehicle Accidents
    a. Vehicle Accident Report (Attachment 3)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement (Attachment 6)

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- Equipment, Property Damage and General Liability Incidents
  a. Incident Investigation Report (Attachment 5)
  b. Witness Statement Form (Attachment 6)
  c. Equipment, Property Damage and General Liability Loss Report (Attachment 4).

- Near Miss
  a. Incident Investigation Report (Attachment 5)

5.2 Supervisor's Employee Injury/Illness Report (Attachment 2)
The Supervisor's Employee Injury Report is to be completed for all incidents that result in an employee occupational injury or illness requiring off-site medical attention. It is to be initiated by the supervisor of the injured employee and forwarded to the respective Business Line Safety Manager for review / comments. Upon completion of review and comments the report should be forwarded, **within 24 Hours,** to the Shaw Corporate Claims department in Baton Rouge, via the corporate claims fax number (225.932.2636).

5.3 Vehicle Accident Report (Attachment 3)
The Vehicle Accident Report must be completed for any vehicle accident in which a company vehicle is involved. This includes company-owned or leased vehicles, rental vehicles, and personal vehicles being used for company business. This report is to be initiated by both the employee involved in the accident and his/her direct supervisor and forwarded to the respective Business Line Safety Manager for review / comments. Upon completion of review and comments the report should be forwarded to the Shaw Corporate Claims department in Baton Rouge (fax number 225.932.2636).

5.4 Equipment, General Liability, Property Damage, and Loss Report (Attachment 4)
The General Liability, Property Damage, and Loss Report is to be used for all losses or damage to company property in excess of $2,500.00. This form must be completed for all third party property, regardless of value, damaged as a result of company activities. The employee most familiar with the events that contributed to the loss or damage will complete the form, and then forward it to the project/location manager. The Corporate Claims Department and the respective Business Line Safety Manager must receive a copy of the report within one business day of the incident.

5.5 Incident Investigation Report (Attachment 5)
All injuries, illnesses, accidents, and near miss incidents will be investigated. Once arrangements for immediate medical care have been made, the employee's direct supervisor, with assistance from the health and safety representative and Business Line Health and Safety Manager, will:

- Collect the facts;

- Describe and document (include sketch, photos, etc.) how the incident occurred;

- Collect support documentation (JSA's, AHA's, Tailgate Safety Meetings, Work Orders, etc.);

- List witnesses and collect written statements;

  If applicable, contact the employee's Functional Manager in an effort to gain relevant information

- Identify the causative factors;

- Identify potentially unsafe acts or unsafe conditions that may have contributed to the incident;

- Identify potential curative action; and

- List the corrective actions which are to be executed, appropriate curative action, the person(s) responsible for the corrective action, and the date by which action is to be completed.

The investigation will be started as soon as possible following the incident and the relevant reports and support documentation (JSA's, AHA's, Tailgate Safety Meetings, Work Orders, etc.) shall be submitted to the appropriate Business Line Health and Safety Manager within 72 hours. In addition to the previous information, reports from external sources (police, insurance carriers, testing laboratories, etc.) are to be obtained as soon as they become available and forwarded by the Business Line Safety Manager to the Corporate Claims department in Baton Rouge.

5.6 Injured Employee Statement & Witness Statement Forms (Attachment 6a & 6b)
The Injured Employee and Witness Statement Forms allow for consistency in the development of the investigation process. The Injured Employee Statement must be completed in all cases where an employee injury results in off site medical treatment. If there are witnesses to the accident/incident, the Witness Statement form should be completed and signed by the subject witness. Both of these forms should be attached to the incident investigation report. It is essential that these statements are executed immediately following the incident to ensure an accurate account of the events.

5.7 Accident Review Board (ARB) (Attachment 7)
The purpose of the Accident Review Board is to collect and review the information gathered for each incident, report that information to the Legal Department and take appropriate curative action. In all cases, the purpose of the entire investigative process, inclusive of conducting an ARB, is to identify curative actions as it relates to the incident / injury. Accordingly, a diligent and concerted effort to accomplish these tasks must be established at the onset of all of the subject incidents.

In order to assist the Legal Department in evaluating the risk to, or liability of, the company, associated with OSHA recordable injuries, chargeable vehicle accidents, fatalities or incidents resulting in significant property damage, the responsible Project / Location Manager is required to coordinate with all parties and set up the ARB such

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that it occurs **within 10 days of the accident**. The respective Business Line Health and Safety Manager, whose project/location experiences accident is then required to conduct the subject ARB.

The Accident Review Board shall be composed of the project/location manager, the employee's direct supervisor (at time of incident), a health and safety representative, and the employee(s) involved in the incident.

Additionally, there may be cases that involve an employee that has been assigned to a project and the Functional Manager of that employee may not have direct knowledge of an incident. In cases such as these, the Functional Manager shall be notified of the incident and requested to participate in the ARB. Also, as determined by the Business Line Health and Safety Manager, a representative of other internal sources of expertise should be involved where applicable.

All investigations and associated materials obtained and/or produced, in association with injuries/illnesses resulting in OSHA recordable classification, chargeable vehicle accidents, fatalities or incidents resulting in significant property damage, are to be performed for and on behalf of the legal department and will be subject to being classified as Confidential Attorney-Client / Attorney Work Product. If the ARB is initiated under a Confidential Attorney-Client / Attorney Work Product status, all documents and other work product arising out of, or associated with, the investigation process, including the ARB, shall be prepared in anticipation of litigation. The Accident Review Board report, and associated documents, is submitted to the Corporate Safety Department, for production to and retention on behalf of the Legal Department.

The ARB report, and all associated documents, shall be completed as soon as practicable, but not more than 5 business days following the ARB meeting, and forwarded by the Business Line Safety Manager to the Corporate Safety Department, via the Corporate Claims fax number. The original documents shall then be mailed to the Corporate Safety Department. These documents shall then be filed in a lockable cabinet, separate from files not meeting the subject criteria, by the Corporate Safety Department, for production to and retention on behalf of the Legal Department. In the event that copies of these files are maintained by Business Line Safety Managers and / or the respective location in which the injury occurred, the same filing criteria shall be followed. The criteria shall be that these documents are filed in lockable cabinets, separate from files not meeting the subject Attorney-Client / Attorney Work Product criteria.

It is generally not acceptable to discipline an employee for having an accident. However, if in the opinion of the Accident Review Board, it is determined that the accident resulted from an intentional unsafe act or intentional violation of company procedure on the employee's part, the employee may be subject to disciplinary action in accordance with the company's progressive disciplinary action system (see Human Resources Procedure HR207).

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5.8 **Monthly Loss Report**
Each business line Health and Safety Manager is responsible to submit a Monthly Loss Report summarizing incidents that took place within their business line during the previous month. The business line Health and Safety Manager is responsible for submitting a consolidated package for the entire business line to the corporate health and safety office for **receipt no later than the 10th working day of the following month**.

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 Disciplinary Action
HS013 Health and Safety Procedure Variances
HS101 Drug and Alcohol Testing
HS800 Motor Vehicle Operations - General Requirements
HS810 Commercial Motor Vehicles

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Supervisor's Employee Injury/Illness Report
3. Vehicle Accident Report
4. Equipment, Property Damage and General Liability Loss Report
5. Incident Investigation Report
6. a. Injured Employee Statement
   b. Witness Statement
7. Accident Review Board Report
8. Injury/Illness Classification Guidelines
9. Medical Forms
   a. Authorization for Treatment of Occupational Injury/Illness
   b. Authorization for Release of Medical Information
   c. Return to Work Examination Form.
10. Help Desk / Hotline Notification Guidelines

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ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*					
		Employee	Supervisor	Project/ Location Manager	Site Health and Safety Rep. / Officer	Business Line Health and Safety Manager	Corporate Health & Safety Manager
Issue, Revise, and Maintain Procedure	3.1						X
Report All Incidents to Supervisor	5.1	X					
Notify Health and Safety Representative	5.1		X				
Arrange Medical Care	5.1		X				
Notify Health Resources or Gates McDonald of Incident	5.1		X		X		
Initiate/Complete Company Forms	5.1		X		X		
Complete Investigation of incident	5.5		X	X	X	X	
Complete Equipment, Property Damage and General Liability Loss Report Incident	5.4	X					
Coordinate and Set up Accident Review Board	5.7			X			
Conduct Accident Review Board	5.7					X	
Participate in Accident Review Board	5.7	X	X	X	X	X	
Complete Monthly Loss Report	5.8					X	

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Attachment 2

REPORT ALL WORKER'S COMPENSATION INJURIES TO SHAW CLAIMS DEPARTMENT
FAX REPORT WITHIN 24 HOURS OF INCIDENT TO 225-932-2636.
Phone all Injuries/ Illnesses to Shaw Notification Hotline/Helpdesk
1-866-299-3445

Supervisor's Employee Injury/Illness Report Form

EMPLOYEE INFORMATION

Employee's Social Security Number: Claim Number:
Employee's Name: Home Phone Number:
Home Address: Business Line Code:
Male Female Date of Birth: Hire Date:
Dependents: Dependents Under 18: Marital Status:
Occupation: Department Name:
State Hired: Currently Weekly Wage: Hourly Wage:
Hours/Days Worked Per Week: Days Per Week Hours Worked Per Day:
Employment Status: Employee Report No.: N/A Employee ID No.: N/A
Salaried Continued: Paid For Date of Injury: Education No. of Years:
Ever Injured on the Job: Supervisor Name & Phone:

EMPLOYER INFORMATION

Employer Name: The Shaw Group, Inc.
Work Location:
Contact Name: John Mollere Telephone Number: (800)747-3322, Ext. 572
Employer SIC: Employer Location Code:
Employer FED ID: Employer Code: N/A
Nature of Business:
Policy Number:

ACCIDENT INFORMATION

Date and Time of Injury:
Did the Accident Occur at the Work Location: If no, where did the accident occur? N/A
Accident Address:
Nature of Accident:
Give a Full Description of the Accident: (Be as Factually Complete As Possible)

Are Other WC Claims Involved? No Date and Time Reported to Employer:
Person Reported To:

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WITNESS INFORMATION

Were There Any Witnesses?

If Yes, List Names and How to Contact Them:

INJURY INFORMATION

Which Part of the Body Was Injured? (e.g. Head, Neck, Arm Leg)

What Was the Nature of Injury? (e.g. Fracture, Sprain, Laceration)

Part of Body Location: (e.g. Left, Right, Upper, Lower)

Injury Description:

Source of Injury: Is Employee Hospitalized?

Lost Time: If Yes, What was First Full Day Out:

Date Last Day Worked: Date Disability Began: N/A

Date Returned to Work: Estimated Return Date: N/A

MEDICAL INFORMATION

ER Treated & Released: Hospitalized: Phy./Clinic:

Hospital - Name, Address, Phone Number: Was Employee Transported via Ambulance: Yes No

N/A

Clinic - Name, Address, Phone Number:

ADDITIONAL COMMENTS & INFORMATION

REPORT PREPARED BY

Name: Title:

Signature: Phone:

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ATTACHMENT 3
VEHICLE ACCIDENT REPORT
Page 1 of 2

ACCIDENT DESCRIPTION

This report is to be initiated by the employee involved in the accident or his/her direct supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 HOURS of the accident. Attach police report.

ACCIDENT DATE _____ TIME _____ ☐ A.M. or ☐ P.M.

LOCATION OF ACCIDENT (CITY, STATE) _____

DESCRIPTION OF ACCIDENT _____

WITNESS _____ PHONE NO. _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

POLICE OFFICER'S NAME AND BADGE # _____ DEPARTMENT _____

COMPANY VEHICLE

DRIVER _____ DRIVERS LICENSE NO. _____ STATE _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

WORK PHONE NO. (____) _____ S.S. NO. _____ PROJECT NAME/NO. _____

VEHICLE NO. _____ YEAR _____ MAKE _____ MODEL _____ LICENSE PLATE NO. _____

STATE _____ VEHICLE OWNER: ☐ COMPANY ☐ LEASED/RENTED ☐ PRIVATE VEHICLE

VEHICLE TYPE: ☐ COMMERCIAL MOTOR VEHICLE ☐ NON-COMMERCIAL

IF NOT COMPANY-OWNED: OWNER _____ PHONE NO (____) _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

VEHICLE DAMAGE _____

NO. OF VEHICLES TOWED FROM SCENE _____ NUMBER OF INJURIES _____ NUMBER OF FATALITIES _____

WERE HAZARDOUS MATERIALS RELEASED? ☐ NO ☐ YES IF YES, DESCRIBE MATERIALS _____

OTHER VEHICLE

DRIVER _____ DRIVERS LICENSE NO. _____ STATE _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

PHONE NO. (____) _____ S.S. NO. _____

OWNER'S NAME (☐ CHECK IF SAME AS DRIVER) _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

INSURANCE COMPANY _____ POLICY NO. _____

AGENT'S NAME _____ PHONE NO. (____) _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

VEHICLE YEAR _____ MAKE _____ MODEL _____ PLATE NO. _____ STATE _____

VEHICLE I.D. NO. _____

VEHICLE DAMAGE _____

PASSENGERS: ☐ NO ☐ YES INJURIES: ☐ NO ☐ YES (If Yes, list names and telephone numbers below)

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VEHICLE ACCIDENT REPORT

WEATHER: ☐ Clear ☐ Cloudy ☐ Fog ☐ Rain ☐ Sleet ☐ Snow Other _____

PAVEMENT: ☐ Asphalt ☐ Steel ☐ Concrete ☐ Wood ☐ Gravel/Dirt ☐ Brick/Stone Other _____

CONDITION: ☐ Dry ☐ Wet ☐ Icy ☐ Pot Holes Other _____

TRAFFIC CONTROL: ☐ Traffic Light ☐ Stop Sign ☐ Railroad ☐ No Intersection ☐ No Control

ROADWAY: Number of Lanes Each Direction: _____ ☐ Residential ☐ Divided Highway ☐ Undivided Highway

Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel before the accident with a solid line, and post-accident movement with a broken line.

SYMBOLS:

Your Vehicle ①

Other Vehicle(s) ②③

Pedestrian

Stop Sign

Yield

Railroad

ADDITIONAL INFORMATION: _____

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EMPLOYEE _____ (Print) _____ (Signature) _____ (Date)

SUPERVISOR _____ (Print) _____ (Signature) _____ (Date)

HEALTH & SAFETY REP. _____ (Print) _____ (Signature) _____ (Date)

ATTACH POLICE REPORT TO VEHICLE ACCIDENT REPORT

REPORT MUST BE FAXED TO:
CORPORATE CLAIMS DEPARTMENT (FAX: 225-932-2636)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY.

REPORT ALL CHARGEABLE VEHICLE ACCIDENTS TO SHAW NOTIFICATION HOTLINE/HELPDESK (PHONE: 1-866-299-3445)

ATTACHMENT 4

EQUIPMENT, PROPERTY DAMAGE AND GENERAL LIABILITY LOSS REPORT

This report is to be completed for all losses or damage to company property in excess of $2,500.00 and all third party damage, regardless of value, resulting from company activities.

PROJECT/LOCATION _____ PROJECT NO. _____ DATE _____

ADDRESS _____

HOW DID DAMAGE OR LOSS OCCUR: _____

DESCRIPTION AND VALUE ($) OF DAMAGED/LOST/STOLEN PROPERTY: _____

LOCATION OF DAMAGED/LOST/STOLEN PROPERTY (Before Loss): _____

DATE AND TIME OF DAMAGE, LOSS, OR THEFT: Date: _____ Time: _____ a.m./p.m.

OWNER OF DAMAGED/LOST/STOLEN PROPERTY:

Name _____ Phone No. ( )

Address _____ City _____

Employer and Address _____

INJURED PARTIES (Also complete a Supervisor's Employee Injury Report if a Company Employee):

Name _____ Phone No. ( )

Address _____ City _____

Employer and Address _____

Description of Injury _____

WITNESSES:

1. Name _____ Home Phone ( )
   Home Address _____ City _____
   Employer and Address _____
2. Name _____ Home Phone ( )
   Home Address _____ City _____
   Employer and Address _____

WERE PICTURES TAKEN? ☐ YES ☐ NO

WERE POLICE NOTIFIED? ☐ YES ☐ NO DEPT. _____ REPORT NO. _____

COMPLETED BY: _____ (Print) _____ (Signature) _____ (Date)

PROJECT/LOCATION MANAGER: : _____ (Print) _____ (Signature) _____ (Date)

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REPORT MUST BE FAXED TO:
CORPORATE CLAIMS DEPARTMENT (FAX: 225-932-2636)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY

ATTACHMENT 5
INCIDENT INVESTIGATION REPORT

*** Must Be Completed Within 72 HOURS & Relevant Support Documentation Must Be Attached / Submitted***

Investigation Date _____ Date of Incident _____

Employee Name _____

Supervisor Name _____

Project Number/Name _____ / _____

Location of Incident _____

- Incident Classification
  - Injury: ☐ First Aid ☐ OSHA Recordable ☐ Lost Workday ☐ Restricted Workday
  - Vehicle: ☐ Chargeable ☐ Non-chargeable
  - Near Miss ☐
  - DOT: ☐ DOT Vehicle ☐ DOT Reportable
  - General Liability ☐
- Description (Provide facts, describe how incident occurred, provide diagram [on back] or photos)
- Analysis (What unsafe acts or conditions contributed to the incident?)
- Corrective Action(s) (List corrective action items, responsible person, scheduled completion date)
- Witness Names (Complete Attachment 6 – Employee Witness Statement)

Investigated By _____ Print Name _____ Signature _____ Date

Project/Location Mgr. _____ Print Name _____ Signature _____ Date

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ATTACHMENT 6a
Injured Employee Statement
MUST BE COMPLETED WITHIN 24 HOURS OF THE INCIDENT

This form should be completed by the injured employee involved in the incident. Describe only the facts for which you have personal knowledge. If you have no knowledge of a particular question, write "no knowledge".

Company _____

Exact Location of Incident/Accident _____

Name of Injured Employee _____

Date of Incident/Accident _____ Time _____ am pm

Date of this Statement _____ Time _____ am pm

Time your shift begins? Time _____ am pm Time your shift ends? Time _____ am pm

Name of Known Witnesses:

Name _____

Name _____

Name _____

Name _____

Your Immediate Supervisors Name _____

If not employed by Shaw E&I, enter name of company and phone number _____

Have you had a prior injury similar to this injury? _____

Was it while you were at work? _____

What date did the prior injury occur? _____

Stating Only Factual Information, Describe In Detail What Happened and Include Any Applicable Events Leading to the Incident/Accident.

I certify that, to the best of my knowledge, all of the above information is complete, accurate and factual. I acknowledge that the intentional falsification or altering of facts or making misleading statements may be grounds for disciplinary action.

_____ Signature/Date _____ Print Name

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ATTACHMENT 6b
Employee Witness Statement
MUST BE COMPLETED WITHIN 24 HOURS OF THE INCIDENT

This form should be completed by every employee working in the crew of the injured employee and by every other employee with knowledge of events or circumstances involved in the incident. This information is being solicited from you so that the company can accurately assess the reported incident to avoid similar occurrences in the future. Describe only the facts for which you have personal knowledge. If you have no knowledge of the incident, write "no knowledge".

Company _____

Exact Location of Incident/Accident _____

Name of Injured Employee _____

Date of Incident/Accident _____ Time _____ am pm

Date of this Statement _____ Time _____ am pm

Time your shift begins? Time _____ am pm Ends _____ am pm

Witness Information:

Name _____

Home Phone No. _____

Home Address _____

County _____ Zip _____

Witness' Supervisor Name _____

If not employed by Shaw E&I, enter name of company _____

Company Phone Number _____

Did You See the Incident/Accident? _____

How Far From You (approx., in feet) Did the Incident/Accident Occur? _____

Stating Only Factual Information, Describe in Detail What Happened and Include Any Applicable Events Leading to the Incident/Accident.

_____

_____

_____

_____

_____

_____

_____

I certify that, to the best of my knowledge, all of the above information is complete, accurate and factual. I acknowledge that the intentional falsification or altering of facts or making misleading statements may be grounds for disciplinary action.

_____ Witness Signature/Date

_____ Print Name

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ATTACHMENT 7

ACCIDENT REVIEW BOARD

DATE: LOCATION:

BOARD MEMBERS:

ACCIDENT DATE: EMPLOYEE(S) INVOLVED IN INCIDENT:

INVESTIGATION COMPLETE: YES ☐ NO ☐ ACCIDENT CLASSIFICATION:

THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE REVIEW BOARD FOR THIS INCIDENT (PRINT):

SUPERVISOR: _____ PROJECT/LOCATION MGR.: _____

POTENTIAL CAUSE OF ACCIDENT:

ACTION BY BOARD*:

* ALL ACTIONS BY THE ACCIDENT REVIEW BOARD ARE SUBJECT TO FINAL REVIEW BY THE HUMAN RESOURCES AND LEGAL DEPARTMENTS.

ACCEPTED:

_____ (Employee Signature) _____ (Supervisor Signature)

APPROVED: _____ (Project/Location Manager) REJECTED FOR: _____

APPROVED: _____ (Business Line Health and Safety Manager or Designee) REJECTED FOR: _____

APPROVED: _____ (Business Line Vice President) REJECTED FOR: _____

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ATTACHMENT 8

INJURY/ILLNESS CLASSIFICATION GUIDELINES

First Aid Treatment – If the incident requires only the following types of treatment, consider it first aid. **Do Not** record the case if it involves only:

- Using non-prescription medications at non-prescription strength
- Administering tetanus immunizations
- Cleaning, flushing, or soaking wounds on the skin surface
- Using wound coverings such as bandages, Band-Aids™, gauze pads, etc., or using SteriStrips™ or butterfly bandages
- Using hot or cold therapy
- Using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.
- Using temporary immobilization devices while transporting an accident victim (slings, neck collars, or back boards)
- Drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters
- Using eye patches
- Using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye
- Using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye
- Using finger guards
- Using massages
- Drinking fluids to relieve heat stress

Medical Treatment – Includes managing and caring for a patient for the purpose of combating disease or disorder. The following are **not** considered medical treatments and are not recordable:

- Visits to a doctor or Licensed Health Care Professional (LHCP) solely for the purpose of observation or counseling
- Diagnostic procedures, including administering prescription medications that are used solely for diagnostic purposes
- Any procedure that can be labeled first aid (see above descriptions)

OSHA Recordable Injuries and Illnesses

Work related injuries and illnesses that result in the following should be recorded on the OSHA 300 Log:

- Death
- Loss of consciousness
- Days away from work
- Restricted work activity or job transfer
- Medical treatment beyond first aid.

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You must also record any **work related** injury or illness that involves cancer, chronic irreversible disease, a fractured or cracked bone, or a punctured eardrum.

Additional Recordable Criteria

You must also record the following conditions when they are work related:

- Any needle stick injury or cut from a sharp object that is contaminated with another person's blood or other potentially infectious material
- Any case requiring an employee to be medically removed from a site under the requirements of an OSHA health standard
- Any Standard Threshold Shift (STS) in hearing (i.e., cases involving an average hearing loss of 10dB or more in either ear)
- Tuberculosis infection as evidenced by a positive skin test or diagnosis by a physician or other licensed health care professional after exposure to a known case of active tuberculosis.

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ATTACHMENT 9B
MEDICAL FORMS

AUTHORIZATION FOR TREATMENT OF OCCUPATIONAL INJURY/ILLNESS

Employee Name: _____
Social Security #: _____ Injury: ☐ Illness: ☐
Job Title: _____ Incident Date: _____
Project/Location _____ Location of Accident/Exposure:
Telephone #: _____
H&S Representative: _____
Body Part(s) Injured: _____
Describe in detail how incident occurred: _____

TO TREATING PHYSICIAN:

In the case of occupational injury/illness, please examine the employee and render necessary conservative treatment directly related to the occupational injury/illness.

Light Duty Work:
It is the policy of our company to provide work assignments, whenever possible, for employees with physical activity restrictions resulting from an occupational injury/illness. If the employee will be subject to a restriction, please contact **Health Resources** before releasing the employee, so that a light duty assignment may be arranged.

Medically Unfit to Return to Work:
It is the policy of our company to assist employees unable to return to work, due to an injury/illness, in obtaining needed medical care and other available benefits. Medical findings are also used to help evaluate unsafe conditions that may have led to the incident. Please help us assist our employees by contacting **Health Resources** with your findings as soon as possible, preferably before the employee leaves your office, but not later than the close of business on the day of initial treatment.

Health Resources: Telephone: 1-800-350-4511 Fax: (800) 853-2641

Please Send Reports To Both of the Following: **Health Resources** 600 West Cummings Park, Suite 3400 Woburn, Massachusetts 01801 *AND* **The Shaw Group, Inc. Corporate Claims Department** 4171 Essen Lane Baton Rouge, LA 70809

Please Send Bills To: **The Shaw Group, Inc. Corporate Claims Department**
4171 Essen Lane
Baton Rouge, LA 70809

DOCTOR, Please provide:
Medical Diagnosis: _____
Treatment Provided: _____
Recommended Work Limitation/Restriction: _____
Return Visit Needed: No ☐ Yes ☐ Date if Yes _____ First Aid Only ☐
Physician Name: _____ Physician Telephone: _____
Physician Signature: _____ Date: _____

YOU MUST CALL HEALTH RESOURCES FOR ALL OCCUPATIONAL INJURIES/ILLNESSES REQUIRING OUTSIDE MEDICAL TREATMENT: 1-800-350-4511.

FAX COMPLETED FORM TO HEALTH RESOURCES (800) 853-2641.

Send Bills to Shaw Corporate Claims Department

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ATTACHMENT 9B
MEDICAL FORMS

AUTHORIZATION FOR RELEASE OF PROTECTED MEDICAL INFORMATION

Printed Name: _____ Date of Birth: _____

Address: _____

Social Security #: _____ Home Telephone: _____

Authority to Release Protected Health Information

I hereby authorize the release of medical information, identified in this authorization form, and provide such information to:

HEALTH RESOURCES
600 West Cummings Park, Suite 3400
Woburn, Massachusetts 01801
Phone: (800) 350-4511
Fax: (800) 853-2641

AND

The Shaw Group Inc.
4171 Essen Lane
Baton Rouge, Louisiana 70809
Phone: 225-932-2500
Fax: 225-932-2636

The Information To Be Released includes the following:

Complete health record	Discharge summary	Progress notes
History and physical exam	Consultation reports	X-ray films/images
Laboratory test results	X-ray & Image reports	Itemized bill
Diagnosis & treatment codes	Complete billing record	

Other, (specify) _____

Purpose of the Requested Disclosure of Protected Health Information

I am authorizing the release of my Protected Health Information.

Drug and/or Alcohol Abuse, and/or Psychiatric, and/or HIV/AIDS Records Release

I understand if my medical or billing record contains information in reference to, psychiatric care, sexually transmitted disease, hepatitis B or C testing, previous drug and/or alcohol abuse and/or other sensitive information, I agree to its release. *Check One:* ☐ Yes ☐ No

I understand if my medical or billing record contains information in reference to HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome) testing and/or treatment I agree to its release. *Check One:* ☐ Yes ☐ No

Right to Revoke Authorization

Except to the extent that action has already been taken in reliance on this authorization, the authorization may be revoked at any time by submitting a written notice to ***The Corporate Claims Dept.*** at ***The Shaw Group Inc., 4171 Essen Lane, Baton Rouge, Louisiana 70809***. Unless revoked, this authorization will expire at which time completion of treatment for the injury or illness has been accomplished.

Re-disclosure

I understand the information disclosed by this authorization may be subject to re-disclosure by the recipient and no longer be protected by the Health Insurance Portability and Accountability Act of 1996.

Signature of Patient or Personal Representative Who May Request Disclosure

I understand that I do not have to sign this authorization. However, if health care services are being provided to me for the purpose of providing information to a third-party (e.g. fitness-for-work test), I understand that services may be denied if I do not authorize the release of information related to such health care services to the third-party. I can inspect or copy the protected health information to be used or disclosed. I hereby release and discharge ***The Shaw Group Inc*** of any liability and the undersigned will hold ***The Shaw Group Inc*** harmless for complying with this Authorization.

Signature: _____ **Date:** _____

Description of relationship if not patient: _____

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ATTACHMENT 9C
MEDICAL FORMS

RETURN-TO-WORK EXAMINATION FORM

Exam Date: _____/_____/_____ **Employee Name:** _____

Birth Date: _____/_____/_____ **Social Security #:** _____-_____-_____

Job Title: _____ **Sex:** ☐ Male ☐ Female

Examining Provider: **Please complete this form and fax to Health Resources at (800) 853-2641. Please contact Health Resources at (800) 350-4511 to report status of employee post-treatment.**

DIAGNOSIS: _____

TREATMENT PLAN: _____

MEDICATIONS: _____

PHYSICAL THERAPY: _____

OTHER: _____

☐ May return to full duty work effective ___/___/___

☐ May return to limited duty from ___/___/___ to ___/___/___

☐ Unable to return to work from ___/___/___ to ___/___/___

WORK LIMITATIONS:

☐ Restricted lifting/pushing/pulling: maximum weight in lbs: _____ (company limits all lifting to ≤ 60 lbs).

☐ Work only with right/left hand. ☐ Restricted repetitive motion right/left hand.

☐ Sitting job only. ☐ Restricted operation of moving equipment.

☐ Other: _____

FOLLOW-UP PLAN:

☐ Release from care.

☐ Schedule for follow-up appointment on ___/___/___.
Time _____ AM/PM

☐ Referral to _____
Appointment date ___/___/___ Time _____ AM/PM

Comments: _____

Examiner's Name (*print*)	Examiner's Signature	Date

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ATTACHMENT 10

HELP DESK / HOTLINE NOTIFICATION GUIDELINES

Any incident, as defined in the bulleted items below, requires corporate notification **as soon as practical but not longer than one hour after occurrence**, via the Health and Safety Help Desk / Hotline. This requirement is a corporate wide directive and applies to all Shaw Group companies, not just Shaw E&I. As such, the responsibility for whom makes this notification has purposefully not been defined. This is due to the various types of projects in which The Shaw Group performs activities. Some projects may only consist of three technicians at a site; others may involve multiple levels of site management and consist of 200+ employees. Therefore, the intent is for the supervisory/management person to communicate the notification requirements to his/her employees and make the appropriate determination as to how the notification takes place.

Immediate Corporate Notification via Help Desk: 1-866-299-3445

- Illness and/or injury (doctors cases and above);
- Property damage (dollar amount greater than $2,500);
- Automobile accidents (All);
- Criminal activity (i.e. bomb threat, theft);
- Natural disaster (i.e. earthquakes, flood, storm damage, hurricanes);
- Explosion and/or fires (that results in property damage greater than $2,500 or result in injury);
- Environmental spills/releases (incidents that requires regulatory notification or have an offsite impact);
- Regulatory visit (i.e. OSHA, EPA, DEQ, MSHA, etc.);
- Fatalities

Note:

- Help Desk / Hotline notification is in addition to the requirement to inform Health Resources of all incidents requiring off-site medical attention by calling 1-800-350-4511. This call should be made **prior** to transporting the employee such that they can coordinate physicians' services prior to arrival of the employee to the medical facility.

- As stated above, the notification requirements are a corporate directive and apply to the entire Shaw Group. . Accordingly, Shaw E&I managers/supervisors should use sound judgment as it pertains to the two bulleted items that have been highlighted above. Although they may not be desired events, some Environmental spills/releases that occur may not be an uncommon situation at a particular site. In addition, there may be projects in which the EPA or some other regulatory agency visits on some normal frequency. Events such as these, which would typically be unusual at a construction or fabrication site, are not so unusual to some of our environmental projects. As such, a notification to the helpdesk would not be required.

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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.
- 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

1.0 Purpose and Summary
2.0 Table of Contents
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 3.1 Procedure Responsibility
 3.2 Action/Approval Responsibilities
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 4.1 Safety Inspections and Documentation
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  4.1.2 Project Managers
  4.1.3 Office Managers
  4.1.4 Project Supervisors
  4.1.5 Health and Safety Representative
 4.2 Workshops
5.0 Exception Provisions
6.0 Cross References
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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director 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.

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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
4. Laboratory Inspection Report

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ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM: MANAGEMENT SAFETY INSPECTIONS RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*				
		Senior Managers	Project/ Office Manager	Project Supervisors	Health and Safety Representative	Director of 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	

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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:

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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?			

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PROJECT SAFETY INSPECTION REPORT

PROJECT _____ DATE _____

	YES	NO	N/A
3. Are guards and safety devices in place on power tools?			
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			
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 vehicles 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			
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			
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			
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			
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?			
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)?			

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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			
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			
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			
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			
1. Are ladders regularly inspected?			
2. Are access ways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?			

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PROJECT SAFETY INSPECTION REPORT

PROJECT _____ DATE _____

	YES	NO	N/A
3. Are ladders being used in a safe manner?			
4. Are ladders kept out of passageways, doors, or driveways?			
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 side rails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?			
SITE SAFETY PLAN			
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			
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			
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			
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			

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PROJECT SAFETY INSPECTION REPORT

PROJECT _____ DATE _____

	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?			
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			
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			
1. Are decontamination stations setup 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			
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			
1. Are tailgate safety meetings being conducted daily?			
2. Are current training/medical records maintained on site?			
DOCUMENTATION			
1. Is an OSHA 300 Log maintained on site and posted during February 1, to April 30,?			
2. Are accident report forms available?			
3. Is a copy of health and safety policy and procedures available on site?			

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PROJECT SAFETY INSPECTION REPORT

PROJECT _____ DATE _____

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

DESCRIBE POSITIVE SAFETY OBSERVATIONS

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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:

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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?			

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OFFICE SAFETY INSPECTION REPORT

OFFICE _____ DATE _____

	YES	NO	N/A
4. Is safety equipment on vehicles?			
5. Are loads secure on vehicles?			
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 access ways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?			

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OFFICE SAFETY INSPECTION REPORT

OFFICE _____ DATE _____

	YES	NO	N/A
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?			
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 side rails 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?			
HOUSEKEEPING			
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?			
SITE POSTERS			
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?			
HAZARD COMMUNICATION			
1. Is the written HAZCOM program available?			
2. Is there a MSDS FOR EACH HAZARDOUS CHEMICAL 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?			
DOCUMENTATION			
1. Is an OSHA 300 Log maintained and posted during February1, to April 30?			
2. Are accident report forms available?			
3. Is a copy of health and safety policy and procedures available?			

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OFFICE SAFETY INSPECTION REPORT

OFFICE _____ DATE _____

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

DESCRIBE POSITIVE SAFETY OBSERVATIONS

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ATTACHMENT 4
LABORATORY SAFETY INSPECTION REPORT

LOCATION _____ DATE _____

	YES	NO	N/A
I. FIRST AID			
1. Are first aid kit locations identified and accessible?			
2. Are emergency eye wash/safety showers available and inspected monthly?			
3. Is access to eye wash units and safety showers unimpeded?			
II. PERSONAL PROTECTIVE EQUIPMENT			
1. Are employees wearing safety glasses in the laboratory?			
2. Are laboratory coats worn by all employees and visitors when working with chemicals and/or samples?			
3. Are gloves worn when chemicals and samples are handled?			
III. FIRE PREVENTION/FIRE PROTECTION			
1. Are employees smoking only in designated outdoor areas?			
2. Are flammable storage cabinets available and used when needed?			
3. Has a fire alarm system been established?			
4. Are fire extinguishers available and inspected monthly?			
5. Do employees know the location and use of fire extinguishers?			
6. Are fire extinguisher locations posted?			
7. Have fire extinguishers been professionally inspected during the last year?			
IV. EMERGENCY PLANS			
1. Are emergency telephone numbers posted?			
2. Have emergency escape routes been designated?			
3. Are employees familiar with the emergency signal?			
4. Are appropriate spill kit supplies available?			
5. Are emergency exits marked?			
6. Are sprinkler heads unobstructed?			
V. ELECTRICAL			
1. Are extension cords kept out of wet areas?			
2. Are extension cords arranged so that they are not placed over radiators, steam pipes, through doorways, or under carpets?			
3. Are cords, panels, receptacles, and plugs in good condition?			
4. Are extension cords not being used in lieu of permanent wiring?			
5. Are extension cords not plugged into other extension cords?			
6. Are multi-outlet strips not plugged into other multi-outlet strips?			
7. Has a lockout/tagout system been established?			
8. Are GFCIs being used on all temporary electrical systems and as needed?			
9. Are warning signs exhibited on high voltage equipment (250V or greater)?			
10. Are circuit breakers or fuse panels properly labeled, kept closed, and accessible?			
VI. COMPRESSED GAS CYLINDERS			
1. Are like cylinders segregated and stored in well ventilated areas?			
2. Is smoking prohibited in cylinder storage areas?			
3. Are cylinders stored secure and upright?			
4. Are cylinders protected from snow, rain, etc.?			

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ATTACHMENT 4
LABORATORY SAFETY INSPECTION REPORT

LOCATION _____ DATE _____

	YES	NO	N/A
5. Are cylinder caps in place for storage and movement?			
VII. WALKING AND WORKING SURFACES			
1. Are accessways, stairways, and ramps clean of ice, mud, snow, or debris?			
2. Are stairways and floor openings guarded?			
3. Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?			
4. Are tripping hazards from electrical cords, phone outlets, or other protrusions on the floor prevented by arrangement of furniture or equipment?			
5. Are floors free of loose tiles and projections that can create a tripping hazard?			
VIII. HAZARD COMMUNICATION			
1. Is there a copy of the Chemical Hygiene Plan (CHP) on site?			
2. Have employees been trained in accordance with the CHP?			
3. Are all containers properly labeled as to content, hazard, etc.?			
4. Is there an updated list of chemicals maintained at the laboratory?			
5. Are there MSDSs for the chemicals present in the laboratory?			
6. Do employees know and understand the effects of exposure from the chemicals they work with?			
IX. DOCUMENTATION			
1. Is an OSHA 300A Log maintained on site and posted between February 1and May 1?			
2. Are accident report forms available?			
X. 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. Are cabinets, bookcases, and shelves secured to prevent their falling over?			
4. Is adequate and sufficient lighting provided in all work areas?			
5. Are work stations arranged to be comfortable without unnecessary strains on backs, arms, necks, etc.?			
6. Do machines with exposed moving parts have guards?			
XI. LABORATORY FUME HOODS			
1. Are face velocities posted on each hood?			
2. Is the average face velocity at least 100 ft/min.?			
3. Is the sash position marked or otherwise indicated to show the acceptable position for achieving the desired airflow rate?			
4. Has the hood face velocity been measured with a calibrated instrument in the last 6 months?			
5. Are signs posted on hoods that are not working correctly?			
6. Does the hood contain visual indicators that it is working properly (e.g., manometer, magneheilic guage, etc.)?			

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ATTACHMENT 4
LABORATORY SAFETY INSPECTION REPORT

LOCATION _____ DATE _____

	YES	NO	N/A
XII. GENERAL LABORATORY RULES			
1. Are open-toed shoes and sandals prohibited in the laboratory?			
2. Are eating, drinking, chewing gum or tobacco products prohibited in the laboratory?			
3. Are food refrigerators labeled such as to prevent chemical storage or vice versa?			
XIII. HOUSEKEEPING			
1. Are lab benches orderly?			
2. Are laboratories free of liquid spills?			
3. Are sinks free of accumulated glassware?			
4. Are waste disposal containers available and labeled?			

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PROCEDURE

Subject: JOB SAFETY ANALYSIS (JSA)

1.0 PURPOSE AND SUMMARY

This procedure provides the guidelines to perform a Job Safety Analysis.
The (JSA) is an effective management technique for identifying hazardous conditions and unsafe acts in the workplace. A JSA is intended to analyze the individual steps or activities, which together create a job or specific work duty, and to detect any actual or potential hazards that may be present. This process can identify less obvious potential hazards that may go undetected during routine management observations or audits. **A new JSA must be completed every day, before commencement of any work activity and updated in the event of changing conditions. It should be understood that changing conditions that a work crew encounters during a work period (inclement weather, another contractor began work in area, etc.) requires that the JSA be modified to address the new hazards. The JSA should be changed to reflect new conditions in the task being performed or new hazards not identified previously.**

2.0 TABLE OF CONTENTS

1.0 Purpose and Summary
2.0 Table of Contents
3.0 Responsibility Matrix
- 3.1 Procedure Responsibility
- 3.2 Action/Approval Responsibilities

4.0 Definitions
5.0 Text
- 5.1 General Requirements
- 5.2 Methods of Conducting JSA's
- 5.3 Analyzing The Job
- 5.4 Common Errors
- 5.5 Identifying the Hazards and Potential Accidents
- 5.6 Accident Types
- 5.7 Writing Instructions
- 5.8 Develop Solutions

6.0 Specific Requirements
- 6.1 Sequence of Basic Job Steps
- 6.2 Potential Hazards
- 6.3 Recommended Action Procedure

7.0 References
8.0 Attachments

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3.0 Responsibility Matrix

3.1 Procedure Responsibility

The Manager/Supervisor is responsible for implementing and enforcing this procedure.

The Safety Representative is responsible for monitoring compliance with this procedure.

Each Employee is responsible for complying with the project safety program, along with the rules and regulations as stipulated in this procedure and instructions issued by the employee's supervisor.

It is the responsibility of management and supervision to ensure that this policy is followed. Accordingly, should the project / site requirements stipulate the use of another method of job safety analysis, it is the responsibility of management and supervision to ensure that the proposed method either meets or exceeds this JSA policy and the accompanying JSA form. Any policy or JSA form that does not cover the items contained herein shall not be used.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1

4.0 DEFINITIONS

HAZARD - A potential danger. Oil on the floor is a hazard.
ACCIDENT - An unintended happening that may result in injury, loss or damage.
EXAMPLE - Slipping on the oil is an accident.
INJURY - The result of an accident. A sprained wrist from the fall would be an injury.

5.0 TEXT

5.1 General Requirements

The first page of the JSA form is a checklist that should be used for reference purposes and serves to assist the work crew and supervisor in completing the second page of the JSA. The first page of the JSA form is used to write out the various tasks involved, potential hazards, recommended actions, etc.

Job Safety Analysis is a procedure used to review job methods and uncover hazards:

- That may have been overlooked in a Hazard Analysis, project layout or design of the

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equipment, tools processes or work area.

- That may have developed after production started.
- That may have resulted from changes in work procedures or personnel

The three basic steps in performing a job safety analysis are

- (Job Task) Break the job down into successive steps or activities and observe how these actions are performed.
- (Potential Hazards) Identify the hazards and potential accidents. This is the critical step because only an identified problem can be corrected or eliminated.
- (Recommended Actions) Develop safe job procedures to eliminate the hazards and prevent potential accidents.

5.2 Methods of Conducting JSA's

There are two basic methods for conducting the Job Safety Analysis:

— Direct observation

— Group discussion

A fast and efficient method of conducting a JSA is through direct observations of job performance. In many instances, however, this method may not be practical. However, through direct observation, one can gain knowledge concerning an activity and use it on a future JSA.

For instance, new jobs and those that are done infrequently do not lend themselves to direct observation. When this is the case, the JSA can be made through discussions with persons familiar with the job. Individuals often involved in the process include, but are not limited to, first line supervisors, safety specialists, engineers, experienced employees and outside contractors.

5.3 Analyzing The Job

When analyzing the job, most people start with the worst first. You should be guided by the following factors:

- **Frequency of Accidents** (Including "near misses"):
  An element of a job that repeatedly produces accidents is a candidate for starting a JSA. The greater the number of incidents associated with a job element, the greater its priority claim for a JSA.

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- **New or Revised Jobs**:
  Jobs created by changes in equipment or in processes obviously have no history of accidents, but their accident potential may not be fully appreciated. Analysis should not be delayed until accidents or near misses occur.
  Any changes from the original task/job shall be noted on the form as a revision. Once this has occurred the new found hazards must be reviewed with the crew.

- **Multiple Employee Exposure**
  Jobs that expose more than one individual to potential hazards should also be analyzed.

5.4 Common Errors

Five common errors that are often made when performing a job analysis are:

- Making the breakdown so detailed that an unnecessarily large number of steps are listed.
- Making the job so general that basic steps are not recorded.
- Failure to identify the education and experience level of the target audience.
- Failure to identify end use(s) (i.e., training, actual procedure, basis for procedure, etc.)
- Always relying on the Supervisor for completing the JSA. Supervisor should describe work scope to the crew. The crew should then assist in identifying hazards and controls at the job site with active involvement from the Supervisor. Ultimately, the supervisor is responsible, however, crew members and the Supervisor should be actively involved in each JSA.

5.5 Identifying the Hazards and Potential Accidents

The purpose is to identify all hazards, both **physical** and **environmental**. To do this, ask yourself these questions about each step:

- Is there a danger of striking against, being struck by, or otherwise making harmful contact with an object?
- Can the employee be caught in, on, by or between objects?
- Is there a potential for a slip, trip or fall? If so, will it be on the same elevation or to a different elevation?
- Can he strain himself by pushing, pulling, lifting, bending or twisting?
- Is the Environment hazardous to one's safety or health? Has the weather been considered as a factor? Has the work product of others, as it pertains to the environment, been considered???

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5.7 Accident Types

- Struck by
  - moving or flying object
  - falling material
- Struck against
  - stationary or moving object
  - protruding object
  - sharp or jagged edge
- Contact with
  - acid
  - electricity
  - heat
  - caustic
  - cold
  - radiation
  - toxic and noxious substances
- Overexertion / repetitive
  - Lifting
  - pulling
  - pushing
  - reaching
  - twisting
- Caught
  - in
  - on
  - between
- Fall to
  - same level
  - lower level
- Bodily reaction from
  - voluntary motion
  - involuntary motion
- Rubbed or abraded by
  - friction
  - pressure
  - vibration

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5.8 Writing Instructions

- Put any qualifying statements first, not last.
- Start each instruction with an action word.
- Each instruction should be observable.
- Each instruction should be measurable.

When evaluating a given procedure, ask the following question.

"What should the employee do -- or not do -- to eliminate this particular hazard or prevent this potential accident?"
Answer must be specific and concrete to be beneficial. General precautions such as "be careful"; "use caution" or "be alert" are useless. Answers should state what to do and how to do it.

This recommendation, "Make certain the wrench does not slip or cause loss of balance" is incomplete. It does not tell how to prevent the wrench from slipping. Here is a more complete recommendation. "Set the wrench properly and securely. Test its grip by exerting a slight pressure on it. Brace yourself against something immovable, or take a stance with feet wide apart before exerting full pressure. This prevents loss of balance if

the wrench slips."

Job Safety Analyses can be very beneficial if they are performed correctly. They not only result in a safer job, but also increase productivity and eliminate waste. Take the time to do them correctly; **and more importantly, use them.**

5.9 Develop Solutions

The final step in conducting a JSA is to develop a recommended safe job procedure to prevent the occurrence of potential accidents. The principle solutions are:

- Find a new way to do the job.
- Change the physical conditions that create the hazard.
- Try to eliminate remaining hazards by changing work methods or procedures.
- Try to reduce the necessity of doing a job, or at least the frequency that it must be performed.

6.0 Specific Requirements

Instructions for Completing Job Safety Analysis Form

Job Safety Analysis (JSA) is an important accident prevention tool that works by finding hazards and eliminating or minimizing them before the job is performed, and before they have a chance to become accidents.

- Use your JSA for job clarification and hazard awareness
- as a guide in new employee training
- for periodic contacts and for retraining of senior employees
- as a reference tool to be used prior to commencing a job which is performed infrequently
- as an accident investigation tool
- Informing employees of specific job hazards and protective measures.

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6.1 Sequence of Basic Job Steps

Break the job down into steps. Each of the steps of a job should accomplish some major task. The task will consist of a set of movements used to perform a task, and then determine the next logical set of movements.
For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. How does that break down into job steps? Picking up the box from the conveyor and putting it onto a hand truck is one logical set of movements, so it is one job step.

Everything related to that one logical set of movements is part of that job step. The next logical set of movements might be pushing the loaded hand truck to the storeroom. Removing the boxes from the truck and placing them on the shelf is another logical set of movements. Finally, returning the hand truck to the receiving area might be the final step in this type of job.

Be sure to list all the steps in a job. Some steps might not be done each time -- checking the casters on a hand truck, for example. However, that task is part of the job as a whole, and should be listed and analyzed.

6.2 Potential Hazards

Identify the hazards associated with each step. Examine each step to find and identify hazards -- actions, conditions and possibilities that could lead to an accident. It is not enough to look at the obvious hazards. It is also important to look at the entire work environment and discover every conceivable hazard that might exist.

- Be sure to list health hazards as well, even though the harmful effect may not be immediate. A good example is the harmful effect of inhaling a solvent or chemical dust over a long period of time.
- Hazards contribute to accidents, injuries and occupational illnesses. In order to do part three of a JSA effectively, you must identify potential and existing hazards. That's why it's important to distinguish between a hazard, an accident and an injury. Each of these terms has a specific meaning:

Some people find it easier to identify possible accidents, illnesses, and work back from them to the hazards. If you do that, you can list the accident and illness types in parentheses following the hazard. However, be sure you focus on the hazard for developing recommended actions and safe work procedures.

6.3 Recommended Action Procedure

Decide what actions are necessary to eliminate or minimize the hazards that could lead to an accident, injury or occupational illness. Among the actions that can be taken are:

1) engineering the hazard out

2) administrative controls

- job instruction training
- good housekeeping

- good ergonomics
  (Positioning the person in relation to the machine or other elements in the Environmental in such a way as to eliminate stresses and strains)

3) providing personal protective equipment

- List recommended safe operating procedures on the form, and list required or recommended personal protective equipment for each step of the job.
- Be specific. Say exactly what needs to be done to correct the hazard, such as "lift, using your leg muscles." Avoid general statements like "be careful."
- Give a recommended action or procedure for every hazard.
- If the hazard is a serious one, it shall be corrected immediately.

The JSA should be changed to reflect new conditions in the task being performed or new hazards not identified previously.

7.0 REFERENCES

"Job Hazard Analysis", U.S. Dept. of Labor -- OSHA Publication No. 3071

"Job Safety Analysis" -- Safety Manual No. 5; U.S. Dept. of Interior, Mining Enforcement and Safety Administration

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Job Safety Analysis Form

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ATTACHMENT 1
EMPLOYEE AND SUBCONTRACTOR TRAINING REQUIREMENTS

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Manager/ Supervisor	H&S Representative	Employee
Responsible for implementing and enforcing procedure	3.1	X		
Monitoring for compliance with the procedure.	3.1		X	
Complying with the project JSA program, along with the rules and regulations as stipulated in this procedure	3.1			X
Review completed JSA forms for any errors and communicate to the originator of the changes.	5.5		X	

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JOB SAFETY ANALYSIS

DATE:
JOB#:
PERMIT#:
ISSUED BY:

SUPERVISION/FOREMAN _____ _____

Consider the following and check the items which apply to the job, then review with the work crew.

PERMITS
- ____ Required
- ____ Cold Work
- ____ Hot Work
- ____ Entry Permit
- ____ All Conditions Met
- ____ Signed Off When Complete
- ____ Other _____

PERSONAL PROTECTIVE EQUIP. (PPE)
- ____ Type of Gloves
- ____ Composition of Gloves
- ____ Special Purpose Gloves
- ____ Tyvek Suit
- ____ Acid Suit /Slicker Suit
- ____ Rubber Boots
- ____ Mono Goggles (vented/non-vented)
- ____ Face Shield
- ____ Respirator
- ____ Fresh Air
- ____ Ear Protection
- ____ Safety Harness
- ____ Burning Goggles
- ____ Other _____

TOOLS
- ____ Current Inspection
- ____ Proper Tools for the Job
- ____ Good Tool Condition
- ____ Qualifications
- ____ Other _____

EMERGENCY EQUIPMENT
- ____ Fire Extinguishers
- ____ Safety Shower
- ____ Evacuation Route
- ____ Other _____

ACCESS
- ____ Scaffold (properly inspected)
- ____ Ladder (Tied off)
- ____ Manlift
- ____ Personnel Basket (inspected & approved)
- ____ Operator Training
- ____ Special Provisions
- ____ Other

WELDING
- ____ Flashburns
- ____ Combustibles
- ____ Spark Containment
- ____ Shields
- ____ Grounding
- ____ Water Hose
- ____ Fire Extinguisher
- ____ Fire Blanket
- ____ Fire Watch
- ____ Sewer Covers
- ____ Other _____

OVERHEAD WORK
- ____ Barricades
- ____ Signs
- ____ Hole Cover
- ____ Handrail
- ____ Other _____

ELECTRICAL
- ____ Locked & Tagged-out
- ____ Try Start/Stop Switch
- ____ GFCI Test
- ____ Assured Grounding
- ____ Extension Cord Inspection
- ____ Other _____

LIFTING
- ____ Forklift
- ____ Cherry Picker
- ____ Load Chart
- ____ Angle
- ____ Crane
- ____ Chainfall
- ____ Proper Rigging Practices
- ____ Manual Lifting
- ____ Condition of Equipment
- ____ Operator Certificate

HAZARDS (ENVIRONMENTAL)
- ____ Electrical Shock
- ____ Heat Stress
- ____ Heavy Objects
- ____ Hot/Cold Surf. Or Mat.
- ____ Inadequate Lighting
- ____ Line Breaking
- ____ Noise
- ____ Poor Access/Egress
- ____ Sharp Objects
- ____ Other _____

HAZARDS/CHEMICALS
- ____ Chemical Burn Skin/Eyes
- ____ Flammable
- ____ Ingestion
- ____ Inhalation
- ____ Skin Contamination

HAZARDS/BODY
- ____ Fall Potential
- ____ Pinch Points
- ____ Slip-Trip Potential
- ____ Other _____

OTHER WORK IN AREA
- ____ Others Working Overhead
- ____ Type Work Others Doing
- ____ PPE Due to Other Work
- ____ Other _____

Confined Space

Know the Following:

- Possible hazards within the confined space
- First signs of exposure
- How to summons help
- How to track personnel
- Entering and exiting the confined space
- Maintain contact with all entrants by voice or visual
- Do not attempt to rescue unless you are a part of a coordinated effort
- Remain at entry point assume no duties with take you from there.

SUPERVISOR/FOREMAN RECOMMENDATION: _____

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JOB SAFETY ANALYSIS

Shaw The Shaw Group Inc

DATE:
JOB#:
PERMIT#:
ISSUED BY:

Location of Job
(Unit/Location on Project):

Required PPE:

Safely Access/ Location

Safe Haven:

Wind Direction:

Evacuation Route:

Assembly Point:

Supervisor of Work:

JSA Prepared By:

Are other crews in area?

New:

Revised:

Pre-Job Preparation

1. Fill out JSA
2. Review JSA (EVERYONE)
3. Sign JSA (EVERYONE)

Job Task
(What are You Doing)

Audit the Job
Audit Time:

Potential Hazards

Supervisors Comments

Recommended Action or Procedure

Supervisor's Initials:

Crew Name Signatures:

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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

1.0 Purpose and Summary
2.0 Table of Contents
3.0 Responsibility Matrix
  3.1 Procedure Responsibility
  3.2 Action/Approval Responsibilities
4.0 Definitions
5.0 Text
6.0 Exception Provisions
7.0 Cross References
8.0 Attachments

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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

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.

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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

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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

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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): _____

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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.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The EH&S Operations Manager 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 that may expose an employee to a physical or health hazard will be maintained at each office location and project site. This list will be placed in the front section of the MSDS binder discussed in Section 5.4. The local health and safety representative/site safety officer will be responsible for maintaining the list and revising it 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 this case, the container must be labeled with the identity of the chemical and the appropriate hazard warnings, as described above.

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/site safety officer or a designee who will then place a copy into a MSDS binder. This binder will be maintained in the workplace and updated as new materials arrive. The local health and safety representative/site safety officer 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.

Information provided in this training will include:

1. Requirements of the HAZCOM program.
2. Any operations in the work area where hazardous chemicals are present.
3. Location of written hazard communication program, listing of hazardous chemicals present and MSDS.
4. Methods and observations that may be used to detect the presence or release of hazardous chemicals by use of monitoring devices, visual appearance or odor.
5. The physical and health hazards of chemicals in the work area.
6. Protection measures to be utilized to prevent exposure, appropriate work practices, emergency procedures and proper PPE to be used.
7. Explanation of the labeling system and the MSDS and how employees can obtain and use the appropriate hazard information.

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	EH&S Operations Manager
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: DRUG AND ALCOHOL TESTING

1.0 PURPOSE AND SUMMARY

Shaw Environmental & Infrastructure, Inc. and its affiliates, subsidiaries and related entities (hereinafter referred to as collectively as the "Company") has established this Drug and Alcohol Policy to maintain a work environment free from substance abuse; provide a safe and healthy environment for our employees and the general public; maintain the quality and integrity of the Company's products and services; preserve the Company's reputation in the communities where the Company operates; and protect and secure our property and information.

This document is the foundation of Shaw E&I's Drug and Alcohol Policy. The purpose of this Policy is to provide guidelines for all applicants/prospective employees, existing employees, subcontractors, and sub-subcontractors regarding substance use and abuse and to provide supervisors with practical procedures for its administration. Subcontractors and sub-subcontractors are required to document that they maintain a substance abuse prevention program with effectiveness comparable to the Company program. The Company reserves the right to modify this Policy at any time consistent with changes in medical procedures, technologies, the law or the Company's operational needs. This policy shall not, in any event, alter the basic "at will" status of any Company employee, nor shall it create any expressed or implied contractual rights relative to employment with the Company.

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- 4.4 Prescribed Medications

5.0 Drug / Alcohol Screen
- 5.1 Post offer, Pre-Employment Drug Testing (Prior to an employee commencing work activities) (Applicable to all states except Montana)
- 5.2 Random Drug Testing (Applicable to all states, except Connecticut; Maine; Minnesota; Montana; Rhode Island; Vermont; San Francisco, California; and Boulder, Colorado)
  - 5.2.1 Alcohol Misuse Prevention Policy

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- 5.3 Post-Accident Drug / Alcohol Testing (Applicable to all states, except Rhode Island and Vermont.
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6.0 Drug / Alcohol Testing Procedures
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9.0 Drug Alcohol Education / Employee Assistance Program (EAP)
10.0 Attachments

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

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

3.2 Action/Approval Responsibilities

Responsibility Matrix is Attachment 1

4.0 GENERAL PROVISIONS AND DEFINITIONS

4.1 Application of the Policy

This Drug and Alcohol Policy applies to: all applicants or prospective employees of the Company; all Company employees, including officers, directors, and supervisors; and all Company subcontractors and sub-subcontractors.

An applicant or prospective employee of the Company who refuses a post-offer, pre-employment drug test will not be considered for a position with the Company.
An existing employee of the Company, subcontractor or sub-subcontractor who

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refuses to submit to a Drug / Alcohol test is subject to disciplinary action, up to and including termination, pursuant to the Company's guidelines and applicable Federal and State laws. "Company or Host Employer's" premises are defined as: all areas or locations in which work is performed, including, but not limited to employee's lockers, lunch boxes, personal bags and effects, clothing, furniture, desks, drawers, containers, tool boxes, storage facilities, work areas, and vehicles parked on Company property or job site locations and equipment, either owned, borrowed, leased or operated by the Company or Host Employer.

4.2 Illegal Drugs

The use, possession, concealment, manufacture, promotion, transportation, distribution or sale of illegal drugs by any employee of the Company or any employee of any subcontractor or sub-subcontractor of the Company is strictly prohibited on all Company and "Host Employer" premises and during Company working hours.

Illegal drugs are defined as drugs or the synthetic or generic equivalents of drugs, which are illegal under Federal, state, or local laws, including, but not limited to marijuana, heroin, hashish, cocaine, hallucinogens, depressants, and stimulants not prescribed for current medical treatment by an accredited physician.

4.3 Alcohol

Possession or consumption of alcohol on Company or Host Employer's premises or unauthorized consumption while on the job is a violation of Company policy. Alcohol or alcoholic beverages means any beverage that may be consumed which has an alcoholic content and which is subject to state regulatory control for distribution as an alcoholic beverage.

4.4 Prescribed Medications

Any employee undergoing medical treatment prescribed by a physician, dentist or other medical professional that includes the use of any drug or medication capable of affecting the employee's mental or physical abilities must notify his/her supervisor. Should there be any doubt as to the effect of the drug / medication; the Company should be notified immediately.

Any employee's failure to notify his / her supervisor, the Company's Human Resources Department or the Company's Substance Abuse Program Administrator that he / she is undergoing medical treatment which includes the use of any drug or medication capable of affecting his / her mental and physical abilities is a violation of Company policy.

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5.0 DRUG / ALCOHOL SCREEN

The Company may utilize any type of Drug/Alcohol test allowed by both Federal laws and the laws of the state in which an employee is employed to help in the control of or detection of drug or alcohol usage in violation of this policy. Drug/Alcohol tests will be for a job related purpose and consistent with business necessity.

Drug tests may be utilized in, but are not limited to, the following circumstances, as may be allowed under the laws of the jurisdiction in which you are employed:

- Post-offer, pre-employment examinations
- Random sampling
- Post-accident
- Reasonable cause or suspicion
- Post rehabilitation.
- When otherwise requested or required by the client and pursuant to applicable law.

Alcohol tests may be utilized in, but are not limited to, the following circumstances, as may be allowed under the laws of the jurisdiction in which you are employed:

- Post-accident.
- Reasonable cause or suspicion
- Post rehabilitation.
- When requested or required by the client and pursuant to applicable law.

Employees assigned to U.S. Department of Energy (DOE) sites may be required to participate in facility-specific drug and alcohol screening pools meeting the requirements of 10CFR707.

5.1 Post offer, Pre-Employment Drug Testing (Prior to an employee commencing work activities) (Applicable to all states except Montana)

Following an employment offer and prior to becoming an active employee, the applicant/prospective employee will be tested for illegal drugs. No Company employee, subcontractor, or sub-subcontractor will begin work on any project without submitting to and successfully passing an approved, pre-employment drug testing method pursuant to the requirements set forth in this procedure.

In circumstances where a Company employee has been laid-off or terminated from the Company and subsequently re-hired with the Company within a thirty (30) day period, the employee will not be required to submit to a post-offer, pre-employment drug test before beginning work on a project as long as the employee has submitted to a drug test with the Company within one calendar year. In cases where the employee

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is re-hired within thirty (30) days and has not been drug tested with the Company within one calendar year, the employee will be required to submit to a post-offer, pre-employment drug test before the beginning work on a project.

In circumstances where a Company employee has been laid-off or terminated from the Company and subsequently rehired with the Company after a thirty (30) day time period, the employee will be required to submit to a post-offer, pre-employment drug test before beginning work on a project.

5.2 Random Drug Testing (Applicable to all states, except Connecticut; Maine; Minnesota; Montana; Rhode Island; Vermont; San Francisco, California; and Boulder, Colorado)

A mandatory random testing program is in effect and all Company employees are subject to the program unless state law prohibits. Employees will be selected for random drug testing on a quarterly basis by using a computer based random number generator that is matched with the employee's I.D. number. These random tests shall be unannounced and conducted concurrent with the quarterly random selection process. The goal of the program shall be to randomly test a minimum of ten (10) percent of the entire work force not covered by DOT, on a quarterly basis.

Employees assigned to U.S. Department of Energy (DOE) sites may be required to participate in facility-specific drug and alcohol screening pools meeting the requirements of 10CFR707. Employees assigned to other client projects and sites may also be required to comply with client specific programs that may exceed the company requirements for testing.

5.3 Post-Accident Drug / Alcohol Testing (Applicable to all states, except Rhode Island and Vermont)

Subject to Federal and state laws, the Company will conduct post accident/injury drug and/or alcohol tests on any employee receiving medical care for a work related injury. This post accident testing shall be performed as soon as practicable following work related accidents or incidents. Additionally, the company shall require a drug / alcohol test for any employee the Company reasonably believes contributed or caused the accident or incident. A Drug/Alcohol test may be performed in the following situations:

1. Any incident or accident that causes the employee to seek medical care for work related injuries.
2. Any incident or accident resulting in serious personal injury or death.
3. Any property or equipment damage equal to or exceeding $2,500.00.
4. Any Chargeable Vehicle Accident (see HS800).

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5.4 Reasonable Cause Drug / Alcohol Testing

Reasonable cause Drug/Alcohol testing will be performed when an employee is observed, by at least two Company representatives, displaying symptoms or behavior that he/she is using or is under the influence of a substance prohibited by this policy. The two Company representatives shall provide written and signed statements

describing their observations. Such symptoms or behavior include, but is not limited to the following:

- Extreme drowsiness, respiratory depression, large pupils, and slurred speech;
- Disorientation;
- Drunken behavior with or without the use of alcohol;
- Admission by employee of hallucinations, admission by employee of drug/alcohol use on the job;
- Unexplained tremors, convulsions, or violent behavior;
- Excessive absenteeism/tardiness, including established absentee patterns;
- Significant decline in job performance;
- Significant change in personality (misconduct, insubordination);
- Unexplained absences from workstation;
- Information from credible source(s) indicating possible substance abuse;
- Changes in personal hygiene;
- Difficulty in motor coordination.

The individual suspected will not be allowed to operate any equipment, and, if an on-site collection is not available, will be driven by a Company representative for testing, and will not be allowed to return to work until receipt of a negative test.

5.5 Post-Rehabilitation Drug / Alcohol Testing (Applicable to all states, except Maine and Vermont)

Subject to applicable Federal and state laws, any employee who is eligible to return to work after receiving counseling / rehabilitation will be required to sign a return to work agreement, pass a drug and/or alcohol test before returning to duty, and is subject to periodic drug and/or alcohol tests.

6.0 DRUG / ALCOHOL TESTING PROCEDURES

The Company has in place specific written procedures for specimen collection, testing, storage, and laboratory urinalysis. These procedures are available for your review and can be requested from your supervisor, the Company's Human Resources Department, or the Company's Substance Abuse Program Administrator.

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6.1 Collection Sites / Laboratories

The Company will select collection sites and/or laboratories, certified by the U.S. Department of Health and Human Services and/or appropriate state agencies, to conduct Drug/Alcohol tests. The collection sites and/or laboratories will agree to conduct tests in accordance with applicable state and Federal laws and regulations.

6.2 Medical Review Officer (MRO)

The Medical Review Officer is a licensed physician with knowledge of substance abuse disorders. The MRO will receive all dilute specimen reports and all positive drug test results, except pre-employment tests, from the laboratory, and will verify the test result. Pre-employment test results that are reported as positive will not be reviewed by the MRO except in situations where it is required by local or state law.

6.3 Cost of Testing

All costs of Drug/Alcohol tests required by the Company are paid for by the Company. In some circumstances and in accordance with Federal and state laws, an applicant/prospective employee or employee of the Company may be required to reimburse the Company the cost of the Drug/Alcohol Screen.

6.4 Time of Testing

Applicants/prospective employees and employees of the Company are required to submit to a Drug/Alcohol test immediately after notification from the Company. Generally, Drug/Alcohol tests are scheduled immediately before, during, or immediately after an employee's work hours and employees will be given two hours after notification to submit to a Drug/Alcohol test., unless he or she can demonstrate why additional time is required, provide such reason and receive prior approval from the company's Substance Abuse Program Administrator, to allow for an extension of the two (2) hour requirement.

6.5 Inability to Provide Drug Screen Sample

Should any applicant / prospective employee or employee be unable to provide a specimen sample within three hours of the first attempt to provide such specimen for a Drug / Alcohol test, or such other time as may be required by state law, will be treated as refusing to cooperate with the Company's policy and will be subject to disciplinary action, up to and including termination pursuant to the Company's guidelines and applicable Federal and State laws. However, an applicant/prospective employee or employee of the Company who is unable or cannot provide a sample specimen and submit to a Drug/Alcohol test within three hours due to a medical condition or illness must notify the Company's Substance Abuse Program Administrator immediately.

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6.6 Pending Test

Any employee whose test result is pending final analysis confirmation will immediately be removed from the work site until final results are available.

6.7 Medications Which Cause a Positive Result

Some over the counter and prescription medications may result in a positive test. The following over the counter or prescription medication may result in a positive drug test:

Amphetamine	Methylene diozymethamphetamine – MDMA
Methamphetamine	OTC / Naturally occurring products
Codeine	Poppy Seeds
Morphine	Paregoric
Phencyclidine	Hydrocodone
Marijuana-tetrahydrocannabionids	Hydromorphone
Cocaine	Oxydodone

7.0 Results of Drug / Alcohol Screen

7.1 Compliance with the Drug and Alcohol Policy is a condition of Employment

Applicants/prospective employees or employees of the Company who violate any provision in this Policy are subject to disciplinary action, up to and including termination, pursuant to the Company's guidelines and applicable Federal and state laws.

7.2 Positive Drug and Alcohol Tests

Any applicant/prospective employee or existing employee who has a positive Drug/Alcohol test result (pursuant to the minimum cutoffs designated by the Company, Client or otherwise provided by applicable state law) will be notified of a positive Drug / Alcohol test, the consequences of the Drug / Alcohol test and the procedures for a challenging or explaining the Drug / Alcohol test within seventy-two (72) hours of the test result or before any disciplinary or adverse action is taken. Every applicant / employee has the right to inspect and/or obtain a copy of the positive Drug/Alcohol test.

If, after a conditional offer of employment, an applicant / prospective employee tests positive, that individual will not be considered for a position with the Company.

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7.2.1 Positive Drug Tests

Any existing employee of the Company, subcontractor or sub-subcontractor who tests positive is subject to disciplinary action, up to and including termination, pursuant to the company's guidelines and applicable Federal and State laws. An applicant / prospective employee denied employment or an employee of the Company whose employment has been terminated as a result of a positive drug test may re-apply for employment within the Company after waiting at least thirty (30) days after the date of the positive drug test if he/she demonstrates he/she successfully completed or is participating in a supervised drug rehabilitation program (or has otherwise rehabilitated successfully) and is no longer engaging in the illegal use of drugs. The Company will require any such individual to comply with the provisions of this policy and to be subject to periodic Drug testing as is allowed under Federal and/or State laws.

7.2.2 Positive Alcohol Tests

Any existing employee of the Company, subcontractor or sub-subcontractor who has a blood alcohol level of .02 through .039 will be immediately suspended from any work duties with the Company; employee may return to work at his or her next scheduled shift as long as his or her blood alcohol level is below .02.

Any existing employee of the Company, subcontractor or sub-subcontractor who has a blood / alcohol level of .04 or higher will be subject to disciplinary action, up to and including termination, pursuant to the company's guidelines and applicable Federal and State laws. An applicant / prospective employee denied employment or an employee of the Company whose employment has been terminated as a result of a positive alcohol test of 0.04 or higher may re-apply for employment within the Company after waiting at least thirty (30) days after the date of the positive alcohol test if he/she demonstrates he/she successfully completed or is participating in a supervised alcohol rehabilitation program (or has otherwise rehabilitated successfully) and is no longer engaging in the abusive use of alcohol. The Company will require any such individual to comply with the provisions of this policy and to be subject to periodic Alcohol testing as is allowed under Federal and/or State laws.

7.3 Adulterated, Unsuitable or Diluted Samples

Employees:
Adulterated, unsuitable or diluted urine samples, as determined by the MRO and in accordance with State and Federal guidelines, will be treated as positive samples. Employees who furnish adulterated, unsuitable or diluted urine samples may be required to submit to a second drug screen and/or are subject to disciplinary action, up to and including termination pursuant to the Company's guidelines and applicable Federal and State laws. Any retesting of an employee, because of an adulterated, unsuitable or diluted urine sample submission, shall be done in accordance with Section 6.4 of this policy.

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Applicants:
If, after a conditional offer of employment, it is determined that an applicant / prospective employee provided an adulterated or unsuitable urine sample, as determined by the MRO and in accordance with State and Federal guidelines, that individual will not be considered for a position with the Company and the applicant may re-apply for employment with the Company after waiting at least thirty (30) days after the date of the adulterated or unsuitable.

If an applicant provides a diluted urine sample, as determined by the testing laboratory, the sample will be analyzed and measured to level of detection as to determine if the sample contains any trace amounts of illegal drugs (as described in Section 4.2). If then determined that the dilute sample contains any trace amounts of illegal drugs, the employment process will be terminated and the applicant will not be allowed to re-apply for employment until after thirty (30) days following the date of the test. However, if it is determined that the original dilute sample does not contain any trace amounts of illegal drugs, the applicant will be asked to provide a second specimen in accordance with the time of submission requirements outlined in Section 6.4 of this policy. Should it be determined that the second test specimen is dilute, as determined by the MRO and in accordance with State and Federal guidelines, the individual will not be considered for a position with the Company and the applicant may re-apply for employment with the Company after waiting at least thirty (30) days after the date of the dilute test.

8.0 PRIVACY AND CONFIDENTIALITY

8.1 General Policy

Individual privacy and confidentiality will be carefully respected in maintaining a record retention program. Any information obtained through Drug/Alcohol testing unrelated to the use of illegal drugs and/or alcohol will be held in strict confidence by the MRO and not released to the Company. With the exception of the testing laboratory, Medical Review Officer and Drug Program Manager (or other individuals designed by the Company to receive and evaluate test results), the results of individual drug tests will not be released to anyone without the express written authorization of the tested individual, except as ordered by a Court or governmental agency.

Written records will be stored in locked containers or in a secured location. Such records will not be made a part of individual personnel files.

Unless an employee gives his or her written consent, the employee's or Drug/Alcohol test records will not be released to a subsequent employer, absent a court order or federal or state law.

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8.2 Searches and Inspections

The Company may at any time conduct searches and inspections where there is reason to believe that an employee may be in possession of substances which are prohibited under the Company's policies. The Company has the right to inspect an employee's personal property on Company of "Host Employer" premises, including, but not limited to, employee's lockers, lunch boxes, personal bags and effects, clothing, furniture, desks, drawers, containers, tool boxes, storage facilities, work areas, and vehicles parked on Company property or job site locations and equipment, either owned, borrowed, leased, or operated by the Company or Host Employee. This search will be for the purpose of determining if such employees or other persons are in possession, use, transportation, or concealment of any prohibited items or substances. Searches and inspections may be conducted without prior announcement. Submission to a search or inspection is a condition of employment. Failure to cooperate shall result in immediate suspension and is grounds for disciplinary action up to and including termination. Employees acknowledge and agree that they have no expectation of privacy in any space, item, locker, property, or equipment located on premises or equipment owned, operated, leased, provided or controlled by the Company or a Host Employer.

8.3 Criminal Drug Conviction

Any applicant/perspective employee or existing employee who has had a criminal drug conviction for a workplace drug offense must notify the Company within five (5) days of that conviction. When an employee has been convicted (meaning a finding of guilt or imposition of sentence, including a plea of *nolo contendre*) of a workplace drug offense or fails to notify the Company of such conviction, the Company will either pose a sanction on the employee up to and including termination or require the employee to satisfactorily complete a drug-abuse rehabilitation program before returning to work

9.0 DRUG AND ALCOHOL EDUCATION / EMPLOYEE ASSISTANCE PROGRAM (EAP)

Alcohol and drug use awareness education will assist Company representatives and employees to recognize individuals who may be abusing drugs or alcohol. The purpose of alcohol/drug awareness education is to:

- Provide Company employees with an awareness of alcohol and drug use problems concerning the safety and health aspects of such use. To help Company employees recognize symptoms of abuse.
- To help Company employees recognize drugs and drug paraphernalia.
- To help Company employees understand the Company's policy and penalties for violating the policy and to outline procedures for handling situations related to that policy.

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- To reinforce employee awareness of the Company's work rules on this subject.
- To reinforce the dangers of alcohol and drug abuse in the workplace.
- Provide information on the availability of drug counseling, rehabilitation, and employee assistance.

Any covered employee wishing information on substance use and abuse or a list of Employee Assistance Programs available in your area should contact the Company's Human Resources Department, or the Company's Substance Abuse Program Administrator.

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ATTACHMENT 1

Action	Procedure Section	Responsible Party: Employee	MRO	Regional Director of Human Resources	Project/ Office Manager	Health and Safety Representative	Director of Health & Safety
Issue, Revise, and Maintain Procedure	3.1						X
Provide a copy of HS101 to covered Non-DOT Employees	Att. 2			X	X	X	
Provide Specimen	5.0	X					
Contact with collection facilities, approved lab, MRO	Att. 3						X
Handle positive (failed) test	Att. 3		X	X	X		
Verify subcontractor programs	1.0				X	X	
Evaluate Test Results	Att. 3		X	X			X
Coordinate Local Testing Program	Att. 3				X	X	

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ATTACHMENT 2

THE SHAW E&I DRUG AND ALCOHOL POLICY

Acknowledgment

I have read, understand and am responsible for the Drug and Alcohol Policy presented to me by The Shaw Group Inc. I understand that the Drug and Alcohol policy that has been provided to me is a summary of Shaw's policy and does not include the specimen collection and laboratory analysis procedures; however, the complete policy and procedures are available to me for review by requesting same from my supervisor, Human Resources or Shaw's Substance Abuse Program Administrator. I agree to submit to all of its requirements of this Policy and I understand the disciplinary action that will be taken if I am found in violation of this policy. **I understand that compliance with this policy is a condition of my employment with this company. Additionally, I understand that compliance with this policy does not guarantee continued employment and shall not alter the basic "at will" status of my employment.**

Employment Consent Form

Laboratory Testing: I hereby give my voluntary consent for a urine and/or blood sample to be collected from me and submitted for alcohol and/or drug testing. The Shaw Group Inc. may be required to provide test results to other companies with whom The Shaw Group Inc. has contracts to undertake certain work. I hereby further consent to the release of testing results to any such company or companies, or their agents or designees, where release of this information has been requested by said companies of their agents with respect to work undertaken by The Shaw Group Inc. I hereby understand and agree that the companies and agents to whom this information may be provided are designated as agent of The Shaw Group Inc. with respect to receipt of this information only.

Search: I hereby give my consent for The Shaw Group Inc. to search my personal effects, locker, lunch box, purses, parcels and other property located on Company premises, work areas, parking lot, or storage area.

I understand that my consent to this procedure is a condition of employment and that refusal to consent will result in my discharge from employment. I further agree to hold The Shaw Group Inc., its agents, directors, officers, and employees harmless from any and all liability in connection with search and investigation.

Do not sign below if you have not received the Drug and Alcohol Policy that has been provided to you.

Employee Signature Date

Company Representative Signature

Please Print Your Name Here

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ATTACHMENT 3

SPECIMEN COLLECTION PROCEDURES

Subject to laws and regulations of the jurisdiction in which the employee may be employed, the specimen collection shall be conducted in the following manner. Specimens used in testing shall be collected by a certified laboratory or their agents in a manner in compliance with applicable state and federal laws and regulations.

Drug Screen Specimen Collection

A. Scope

1. The drug testing custody and control form is to be used as a permanent record on which identifying data on the employee and on the specimen collection and transfer process are retained. The drug-testing plan requires testing for at least marijuana, cocaine, opiates, amphetamines, and phencyclidine.

2. Urine Drug Screen specimens collected under this plan may be used only to test for controlled substances designated or approved for testing as described in this policy and shall not be used to conduct any other analysis or test.

3. This plan does not prohibit procedures reasonably incident to the analysis of the specimen for controlled substances (e.g., determination of pH or tests for specific gravity, creatinine concentration, or presence of adulterants).

B. Procedures

1. The collection site person shall utilize the drug testing custody and control form (COC) provided by company; this form must address the requirements as contained in § 40.23. The COC form must comply with the provisions as contained in 49 CFR Part 40 with regard to the information that must be contained on the form. (Standard Form #DOT, 3900.0 or equivalent).

2. The drug testing custody and control form may include such additional information as may be required for billing or other legitimate purposes necessary to the collection.

3. A clean, single-use specimen bottle that is securely wrapped until filled with the specimen, and use of a tamper proof sealing system, designed in a manner such to ensure against undetected opening shall be utilized.

4. Written procedures, instructions and training shall be provided as follows:

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a. The Company may contract for and utilize when possible, an independent Collection Site. The independent collection site shall abide by all procedures, techniques, and methods outlined in 49 CFR Part 40, Part 199, and any DOT agency regulation, as well as those outlined in this document.

b. Company collection procedures and training shall clearly emphasize that the collection site person is responsible for maintaining the integrity of the specimen collection and transfer process, carefully ensuring the modesty and privacy of the donor, and is to avoid any conduct or remarks that might be construed as accusatorial or otherwise offensive or inappropriate.

c. The collection site person shall have successfully completed training to carry out this function, or shall be a licensed medical professional, or a technician who has been provided instructions for collection and certifies completion as required in this policy.

d. Unless it is impracticable for any other individual to perform this function, a direct supervisor of an employee shall not serve as the collection site person for a test of the employee.

5. The collection individual shall use a shipping container in which the specimen and associated paper work may be transferred and which can be sealed and initialed to prevent undetected tampering.

C. Security

1. The purpose of this section is to prevent unauthorized access, which could compromise the integrity of the collection process of the specimen.

2. The designated collection site is to be secure. If a collection site facility is dedicated solely to urine collection, it shall be secure at all times. If a facility cannot be dedicated solely to drug testing, the portion of the facility used for testing shall be secure during drug testing.

3. A facility normally used for other purposes, such as a public rest room or hospital examining room, may be secured by visual inspection to ensure other persons are not present and undetected access (e.g., through a rear door not in the view of the collection site person) is not possible. Security during collection may be maintained by effective restriction of access to collection materials and specimens. In the case of a public rest room the facility must be posted against access during the entire collection procedure to avoid embarrassment to the employee or distraction of the collection site person.

4. If it is impractical to maintain continuous physical security of a collection site from the time the specimen is presented until the sealed mailer is transferred for shipment, the following minimum procedures shall apply:

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a. The specimen shall remain under the direct control of the collection site person from delivery to its being sealed in the mailer.
b. the mailer shall be immediately mailed, maintained in secure storage, or remain until mailed under the personal control of the collection site person.

D. Chain-of-Custody

1. The chain-of-custody block of the drug testing custody and control form shall be properly executed by authorized collection site personnel upon receipt of specimens.

2. Handling the transportation of urine specimens from one authorized individual or place to another shall always be accomplished through chain-of-custody procedures. Every effort shall be made to minimize the number of persons handling specimens.

E. Access to Authorized Personnel Only

1. No unauthorized personnel shall be permitted in any part of the designated collection site when urine specimens are collected or stored. Only the collection site person may handle specimens prior to their securement in the mailing container or monitor or observe a specimen collection (under the conditions specified in this section).

2. To promote security of specimens, avoid distraction of the collection site person, and ensure against any confusion in the identification of specimens, the collection site person shall have only one donor under supervision at anytime.

3 For this purpose, a collection procedure is complete when the urine bottle has been sealed and initialed, the drug testing custody and control form has been executed, and the employee has departed the site (or, in the case of an employee who was unable to provide a complete specimen, has entered a waiting area).

F. Privacy

1. Procedures for collecting urine specimens shall allow individual privacy unless there is a reason to believe that a particular individual may alter or substitute the specimen to be provided, as further described in this section.
2. For purposes of this procedure, the following circumstances are the exclusive grounds constituting a reason to believe that the individual may alter or substitute the specimen:

   a. The employee has presented a urine specimen that falls outside the normal temperature range (32.0_C/90_F – 38_C/100_F), and
      (1) the employee declines to provide a measurement of oral body temperature, as provided in paragraph G.14. of this section; or
      (2) oral body temperature varies by more than 1_C/1.8_F from the temperature of the specimen.

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   b. The last urine specimen provided by the employee (i.e., on a previous occasion) was determined by the laboratory to have a specific gravity of less than 1.003 and a creatinine concentration below .2g/L.

   c. The collection site person observes conduct clearly and unequivocally indicating an attempt to substitute or adulterate the sample (e.g., substitute urine in plain view, blue dye in specimen presented); or

   d. The employee has previously been determined to use a controlled substance without medical authorization or the particular test was being conducted under a DOT regulation providing for follow-up testing upon or after return to service.

3. A higher-level supervisor of the collection site person, or a designated employer representative, shall review and concur in advance with any decision by a collection site person to obtain a specimen under the direct observation of a same gender collection site person based upon the circumstances described in paragraph 2 above.

G. Integrity and Identity of the Specimen

The collection site person shall take precautions to ensure that a urine specimen is not adulterated or diluted during the collection procedure and that information on the urine bottle and on the urine custody and control form can identify the individual from whom the specimen was collected. The following minimum precautions shall be taken to ensure that unadulterated specimens are obtained and correctly identified:

1. To deter the dilution of specimens at the collection site, toilet-bluing agents shall be placed in toilet tanks wherever possible, so that reservoir of water in the toilet bowl always remains blue. Where practicable, there shall be no other source of water (e.g., no shower or sink) in the enclosure where urination occurs. If there is another source of water in the enclosure, it shall be effectively secured or monitored to ensure it is not used as a source for diluting the specimen.

2. When an individual arrives at the collection site, the collection site person shall ensure that the individual is positively identified as the employee selected for testing (e.g., through presentation of photo identification or identification by the employer's representative). If the individual's identity cannot be established, the collection site person shall not proceed with the collection. If the employee requests, the collection site person shall show proper identification to the employee. The employee shall complete any required registration/consent form at collection site.

3. If the individual fails to arrive at the assigned time, the collection site person shall contact the appropriate authority to obtain guidance on the action to be taken.

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4. The collection site person shall ask the individual to remove any unnecessary outer garments such as a coat or jacket that might conceal items or substances that could be used to tamper with or adulterate the individual's urine specimen. The collection site person shall ensure that all personal belongings such as a purse or briefcase remain with the outer garments. The individual may retain his or her wallet. If the employee requests it, the collection site person shall provide the employee a receipt for any personal belongings.

5. The individual shall be instructed to wash and dry his or her hands prior to urination.

6. After washing hands, the individual shall remain in the presence of the collection site person and shall not have access to any water fountain, faucet, soap dispenser, cleaning agent, or any other materials which could be used to adulterate the specimen.

7. The individual may provide their specimen in the privacy of a stall or otherwise partitioned area that allows for individual privacy. The collection site person shall provide the individual with a specimen bottle or collection container, if applicable, for this purpose.

8. The collection site person shall note any unusual behavior or appearance on the urine custody and control form.

9. In the exceptional event that an employer-designated collection site is not accessible and there is an immediate requirement for specimen collection (e.g., circumstances require a post-accident test), a public restroom may be used according to the following procedures: A collection site person of the same gender as the individual shall accompany the individual into the public restroom which shall be made secure during the collection procedure. If possible, a toilet-bluing agent shall be placed in the bowl and any accessible toilet tank. The collection site person shall remain in the restroom, but outside the stall, until the specimen is collected. If no bluing agent is available to deter specimen dilutions the collection site person shall instruct the individual not to flush the toilet until the specimen is delivered to the collection site person. After the collection site person has possession of the specimen, the individual will be instructed to slush the toilet and to participate with the collection site person in completing the chain-of-custody procedures.

10. If the company is using the single collection method then the following procedures shall be used:
    a. The collector may choose to direct the employee to urinate either directly into a specimen bottle or into a separate collection container.
    b. If a separate collection container is used, the collection site person or the employee shall pour at least 30 ml of the urine from the collection container into the specimen bottle in the presence of the employee.

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11. Collection Methodology.
    a. In either collection methodology, upon receiving the specimen from the individual the collection site person shall determine if it has at least 30 ml of urine for a single specimen collection or 45 ml of urine for a split specimen collection.
    b. If the individual has not provided the required quantity of urine, the specimen shall be discarded. The collection site person shall direct the individual to drink up to 40 ounces of fluid, distributed reasonably through a period of up to three hours, or until the individual has provided a new urine specimen, whichever occurs first. If the employee refuses to drink fluids as directed or to provide a new urine specimen, the collection site person shall terminate the collection and notify the employer that the employee has refused to submit to testing.
    If the employee has not provided a sufficient specimen within three hours of the first unsuccessful attempt to provide the specimen the collection site person shall discontinue the collection and notify the employer.

12. After the specimen has been provided and submitted to the collection site person, the individual shall be allowed to wash his or her hands.

13. Immediately after the specimen is collected, the collection site person shall measure the temperature of the specimen. The temperature-measuring device used must accurately reflect the temperature of the specimen and not contaminate the specimen. The time from urination to temperature measure is critical and in no case shall exceed 4 minutes.

14. A specimen temperature outside the range of 32.0_C90_F - 38_C/100_F, constitutes a reason to believe that the individual has altered or substituted the specimen (See Section F.2.a.). In such cases, the individual supplying the specimen may volunteer to have their temperature taken to provide evidence to counter the reason to believe the individual may have altered or substituted the specimen.

15. Immediately after the specimen is collected, the collection site person shall also inspect the specimen to determine its color and look for any signs of contaminants. Any unusual findings shall be noted on the urine custody and control form.

16. All specimens suspected of being adulterated shall be forwarded to the laboratory for testing.

17. Whenever there is reason to believe that a particular individual has altered or substituted the specimen as described in Section F.2.a. and c., a second specimen shall be obtained as soon as possible under the direct observation of a same gender collection site person.

18. Both the individual being tested and the collection site person shall keep the specimen in view at all times prior to its being sealed and labeled. As provided below, the specimen shall be sealed by placement of a tamper-proof seal over the

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bottle cap and down the sides of the bottle and labeled in the presence of the employee. If the specimen is transferred to a second bottle, the collection site person shall request the individual to observe the transfer of the specimen and the placement of the tamper-proof seal over the bottle cap and down the sides of the bottle.

19. The collection site person and the employee shall be present at the same time during procedures outlined in items 20 through 24 of this section.

20. The collection site person or employee shall place securely on the bottle an identification label, which contains the date, the individual's specimen number, and any other identifying information provided or required by the employer. If separate from the label, the tamper-proof seal shall also be applied.

21. The specimen donor shall initial the identification label on the specimen bottle for the purpose of certifying that it is the specimen collection from the donor.

22. The collection site person shall enter on the drug testing custody and control form all information identifying the specimen. The collection site person shall sign the drug testing custody and control form certifying that the collection was accomplished according to the applicable Federal requirements.

23. The individual shall be asked to read and sign a statement on the drug testing custody and control form that the specimen collected from him/her is in fact that specimen he/she provided.

24. The collection site person shall complete the chain-of-custody portion of the drug testing custody and control form to indicate receipt of the specimen from the employee and shall certify proper completion of the collection.

25. The urine specimen and chain-of-custody form are now ready for shipment. If the specimen is not immediately prepared for shipment, the collection site person shall ensure that it is appropriately safeguarded during temporary storage.

26. Control of Specimen

    a. While any part of the above chain-of-custody procedures is being performed, it is essential that the urine specimen and custody documents be under the control of the involved collection site person.

    b. If the involved collection site person leaves their workstation momentarily, the collection site person shall take the specimen and drug testing custody and control form with them or shall secure them. After the collection site person returns to the workstation, the custody process will continue. If the collection site person is leaving for an extended period of time, they shall package the specimen for mailing before leaving the site.

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    c. The collection site person shall not leave the collection site in the interval between presentation of the specimen by the employee and securement of the sample with an identifying label bearing the employee's specimen identification number and seal initialed by the employee. If it becomes necessary for the collection site person to leave the site during this interval, the collection shall be nullified and at the election of the company a new collection may be begun.

27. Collection Control.

    To the maximum extent possible, collection site personnel shall keep the individual's specimen bottle within sight both before and after the individual has urinated. After the specimen is collected, it shall be properly sealed and labeled.

28. Transportation to Laboratory

    Collection site personnel shall arrange to ship the collected specimens to the drug-testing laboratory. The specimens shall be placed in shipping containers designed to minimize the possibility of damage during shipment (e.g., specimen boxes and/or padded mailers); and those containers shall be securely sealed to eliminate the possibility of undetected tampering. On the tape sealing the container, the collection site person shall sign and enter the date specimens were sealed in the containers for shipment. The collection site person shall ensure that the chain-of-custody documentation is attached to each container sealed for shipment to the drug-testing laboratory.

29. Failure to Cooperate

    If the employee refuses to cooperate with the collection process, the collection site person shall inform the designated company representative and shall document the non-cooperation on the drug testing custody and control form.

30. Employee Requiring Medical Attention

    If the sample is being collected from an employee in need of medical attention part of a post-accident test given in an emergency medical facility, necessary medical attention shall not be delayed in order to collect the specimen.

31. Use of Chain-of-Custody Forms

    A chain-of-custody form shall be used for maintaining control and accountability of each specimen form the point of collection to final disposition of the specimen. The date and purpose shall be documented on the form each time a specimen is handled or transferred and every individual in the chain shall be identified. Every effort shall be made to minimize the number of persons handling specimens.

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Evidential Breath Testing (EBT) for Alcohol

A. Scope

1. The evidential and non-evidential testing procedures set forth in this section was developed from utilizing, as a guidance document, the requirements as set forth in 49 CFR Part 40 and specifies the required form and disposition of such testing forms.

B. Alcohol Testing Form

1. The Company may utilize a form similar to that of a DOT Breath Alcohol Testing form or a form that is directly generated by an EBT and may omit the space for affixing a separate printed result to the testing form. In all cases, the form shall provide triplicate or three consecutive identical copies with copy 1 being retained by the company, copy 2 shall be provided to the employee, and copy 3 shall be retained by the BAT/STT.

2. The breath alcohol testing form may include such additional information as may be required for billing or other legitimate purposes necessary to the testing, provided that personal identifying information on the individual (other than the social security number or employee identification number) may not be provided.

C. Breath Testing Locations

1. The Company shall ensure that there are sufficient breath testing sites or the availability of BATs/STTs located within a reasonable proximity to each of the company's work locations.

2. The Company shall conduct the testing in a location that affords visual and aural privacy to the employee being tested. All necessary equipment, personnel, and materials for conducting the alcohol testing shall be provided at the testing site.

3. A mobile collection facility, such as a van that is equipped for alcohol testing, that meets the requirements set forth in this procedure may be utilized.

4. No unauthorized persons shall be permitted access to the testing site when the EBT remains unsecured, or to prevent such individuals from seeing or hearing a test result.

5. In some circumstances the company may have to conduct such alcohol testing outdoors at the scene of an accident that does not meet the requirements as specified in post-accident provisions of the procedure. In these situations the BAT/STT shall provide the necessary visual and aural privacy to the employee to the greatest extent practicable.

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6. The BAT/STT shall supervise only one employee's use of the EBT at a time. The BAT/STT shall not leave the alcohol testing site while the testing process is in progress.

D. Alcohol Testing Equipment

1. General.

   The company shall use only approved evidential breath testing (EBT) devices and non-evidential devices for conducting the alcohol testing provisions required in the program. These devices are listed on NHTSA's conforming products list (CPL).

2. Screening Devices.

   The company shall utilize either non-evidential devices or EBTs listed on the CPL for screening tests.

3. Confirmation Devices.

   The company shall utilize an EBT listed on the CPL for confirmation testing.

4. NHTSA Conforming Products List (CPL).

   All devices that will be used by the company for alcohol testing are NHTSA approved evidential breath alcohol testing devices. NHTSA has model specifications for evidential breath testing devices. NHTSA periodically publishes an updated Conforming Products List, which states which devices have met NHTSA standards.

5. Quality Assurance Plans for Evidential Breath Testing Devices. Each EBT used shall have an approved quality assurance plan (QAP) to include the following:

   a. Methods for conducting external calibration.

   b. Minimum intervals for performing external calibrations

   c. Tolerance on an external calibration check.

   d. Inspection, maintenance, and calibration requirements.

   Each QAP is submitted to NHTSA for approval. Records demonstrating that the EBTs are subject to required external calibration checks will be maintained. An EBT will be taken out of service if any external calibration check results in a reading outside the tolerance for the EBT set forth in the QAP. The EBT will not be used again until it has been serviced and has had an external calibration check resulting in a reading within the tolerance for the EBT.

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This company will ensure that required inspections, maintenance and calibration checks are conducted. When the EBT is not being used it will be stored in a secure location.

6. Quality Assurance Plans for Non-Evidential Screening Devices. Each Non-Evidential Screening Device used shall have an approved quality assurance plan (QAP) to including the following:

   a. The plan shall designate the method or methods to be used to perform quality control checks; the temperatures at which the non-evidential screening device shall be stored and used, as well as other environmental conditions (e.g., altitude, humidity) that may affect the performance of the device; and, where relevant, the shelf life of the device.

   b. The QAP shall prohibit the use of any device that does not pass the specified quality control checks or that has passed its expiration date.

The manufacturers' instructions on or included in the package for each saliva testing device shall include directions on the proper use of the device, the time frame within which the device must be read and the manner in which the reading is made.

The employer and its agents shall comply with the QAP and manufacturer's instructions for each non-evidential screening device it uses for alcohol screening tests.

E. Breath Alcohol Testing Preparations

1. When an employee arrives at the alcohol testing site, the BAT/STT shall ensure that the individual is positively identified as the employee selected for alcohol testing (e.g., through presentation of photo identification or identification by the company's representative). If the employee's identity cannot be established, the BAT/STT shall not proceed with the alcohol test. If the employee requests, the BAT/STT shall show proper identification to the employee.

2. The BAT/STT shall explain the alcohol testing process to the employee.

3. If the employee fails to arrive at the assigned time, the BAT/STT should contact the appropriate company authority to obtain guidance on any action to be taken.

F. Screening Test Procedures for Evidential Breath Testing and Non-Evidential Breath Testing Devices.

1. The BAT shall begin the alcohol testing process by completing Step 1 on the Alcohol Breath Testing form. The employee shall then complete Step 2 by signing the certification. Refusal by the employee to sign the certification shall be regarded as a refusal to take the alcohol test.

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2. The BAT shall select an individually sealed mouthpiece, it shall be opened in full view of the employee and attached to the EBT in accordance with the manufacturer's instructions.

3. The BAT shall instruct the employee to blow forcefully into the mouthpiece for at least 6 seconds or until the EBT instrument indicates that an adequate amount of breath has been obtained.

4. The BAT shall show the employee the result displayed on the EBT. The BAT shall record the displayed result, testing device, serial number of the testing device, time and quantified result in Step 3 of the form.

5. If the EBT prints the test result directly onto the alcohol form, then the BAT shall show the employee the result displayed on the EBT.

6. If the EBT does not provide a printed result, the BAT shall show the employee the result displayed on the EBT. The BAT shall then record the test result onto the breath alcohol test form in the designated space and the employee will sign the form as to acknowledge the results. The result shall be entered in such a manner that will provide clear evidence as to the results that were displayed by the EBT.

7. If the result of the screening alcohol test is a breath alcohol concentration of less than 0.04, the BAT shall date the form and sign the certification in Step 3 of the form. The employee shall then sign the certification and fill in the date in Step 4 of the form. If the employee does not sign the certification in Step 4, it shall not be considered a refusal to be tested. In this event, the BAT shall note the employee's failure to sign in the "Remarks" section of the form.

8. If the EBT has printing capabilities, and the test result printed by the EBT does not match the displayed result, the BAT shall note the disparity in the "Remarks" section. Both the BAT and the employee shall initial or sign the notation. The alcohol test is invalid and the company representative and the employee shall be so advised.

9. At this point, no further testing is authorized. The BAT shall transmit the result of less than 0.04 to the appropriate company representative in a confidential manner. The company shall receive and store the information so as to ensure that confidentiality is maintained as required in the procedure.

10. If the result of the screening test is an alcohol concentration of 0.04 or greater, then the BAT shall perform a confirmation test. If a different BAT will conduct the confirmation test, then the BAT who conducts the screening test shall complete and sign the form and log entry. The BAT will upon completion of the alcohol test provide the employee with Copy 2 of the breath alcohol testing form.

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G. Confirmation Test Procedures.

1. When a BAT other than the one who conducted the screening test is required to conduct the confirmation test, the new BAT will require the employee to provide positive identification such as photo ID card or identification by a company representative. The BAT will, upon request of the employee being tested, provide such identification.

2. The BAT shall instruct the employee not to eat, drink, put any object or substance in his/she mouth and, to the extent possible, not belch during the waiting period just prior to the confirmation test being conducted. This waiting period shall begin with the completion of the screening test and shall not be less than 15 minutes, but must be within 30 minutes of the completion of the screening test. The time the employee spends in transit between the screening test and confirmation test, the employee is under direct observation, counts toward the mandatory 15 minute deprivation period. If the BAT conducts the confirmation test more than 30 minutes after the result of the screening test has been obtained the BAT shall note in the "Remarks" section of the form the time that elapsed between the screening and the confirmation test and the reason why the confirmation test could not be conducted within 30 minutes of the screening test. The BAT shall explain to the employee that the reason for this is to prevent any accumulation of mouth alcohol leading to an artificially high reading and that it is for the benefit of the employee to comply with these instructions. The BAT shall also explain that the test will be conducted at the end of the required waiting period, even if the employee has disregarded the instructions. Should the BAT become aware that the employee has not complied with the instructions as provided, the BAT shall note the observations in the "Remarks" section of the form.

3. When a BAT other than the one who conducted the screening test is required to conduct the confirmation test, the new BAT shall initiate a new Breath Alcohol Testing form. The BAT shall then complete step 1 on the form and the employee shall then complete Step 2 by signing the certification. If the employee should choose not to sign the certification, the BAT shall then make an appropriate notation in the "Remarks" section indicating the employee's refusal to take the alcohol test. The BAT shall note in the "Remarks" section that a different BAT conducted the screening test.

4. The BAT shall open, in the presence of the employee, a new individually-sealed mouthpiece and attach the mouthpiece to the EBT in accordance with the manufacturer's instructions. The BAT will then instruct the employee to blow forcefully into the mouthpiece for at least 6 seconds or until the EBT indicates that an adequate amount of breath has been obtained.

5. In the event that the screening and confirmation test results are not identical, the confirmation test result shall be deemed to be the final result on which any action by the company may be taken in order to comply with the requirements of the AMPP and any applicable federal requirements.

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6. If the EBT prints the test result directly onto the alcohol form, then the BAT shall show the employee the result displayed on the EBT.

7. If the EBT does not provide a printed result, the BAT shall show the employee the result displayed on the EBT. The BAT shall then record the test result onto the breath alcohol test form in the designated space and the employee will sign the form as to acknowledge the results. The result shall be entered in such a manner that will provide clear evidence as to the results that were displayed by the EBT.

8. After the confirmation test is completed, the BAT shall date the form and sign the certification in Step 3 of the form. The employee shall then be instructed to sign the certification and fill in the date in Step 4. If the employee should elect to not sign the certification or to provide his/her initials in the log book entry for the test conducted, it shall not be considered as a refusal to be tested. The BAT shall then note the employee's failure to sign or initial the log book entry in the "Remarks" section of the testing form.

9. The BAT shall transmit all alcohol testing results to the APM (Alcohol Program Manager) or other designated company representative in a confidential manner. All communications by BATs shall be to the APM or designee only and may be provided in writing, in person, or by telephone or electronic means. The BAT shall ensure that immediate transmission of test results to the company is conducted in order for the company to prevent the employee from performing any covered functions.

10. Should the initial transmission not be accomplished in writing, but via telephone notification, the company designee shall establish a mechanism to verify the identity of the BAT providing the information. The BAT shall follow the initial transmission by providing to the company designee the company's copy of the breath alcohol testing form. The test results shall be stored in such a manner so as to protect the confidentiality of the results and to eliminate the disclosure of information to unauthorized persons.

H. Refusals to Test and Uncompleted Tests.

1. Refusal by an employee to complete and sign Step 2 of the breath alcohol testing form, to provide breath, to provide an adequate amount of breath, or otherwise to cooperate with the testing process in a way that prevents the completion of the test shall be noted by the BAT in the "Remarks" section of the form. The testing process shall be terminated and the BAT shall immediately notify the company representative/designee.

2. If a screening or confirmation test cannot be completed or if an event occurs to invalidate the test, the BAT/STT shall, if practicable, begin a new screening or confirmation test using a new breath alcohol testing form with a new sequential test number.

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I. Inadequate Amount of Breath for EBT Devices

1. If the employee is unable, or alleges that he/she is unable, to provide a sufficient amount of breath to permit a valid breath test because of a medical condition, the BAT or STT shall again instruct the employee to attempt to provide an adequate amount. If the employee refuses to make the attempt, the BAT or STT shall immediately inform the company.

2. If the employee attempts and fails to provide an adequate amount of breath, the BAT or STT shall so note in the "Remarks" section of the testing form and shall immediately inform the company. The company shall direct the employee to obtain, as soon as practical after the attempt, an evaluation from a licensed physician who is acceptable to the company concerning the employee's medical ability to provide an adequate amount of breath.

3. If the physician determines, in his/her reasonable medical judgment, that a medical condition has or could have precluded the employee from providing an adequate amount of breath, the employee's failure to provide an adequate amount of breath shall not be deemed as a refusal to take an alcohol test. The physician shall provide to the company representative a written statement of the basis of his/her conclusion.

4 If the physician, in his/her reasonable medical judgment, is unable to make the determination that a medical condition has precluded the employee from providing an adequate amount of breath, the employee's failure to provide an adequate amount of breath shall be regarded as a refusal to take a test. The physician shall provide a written statement of the basis for his/her conclusion to the company.

J. Invalid Tests

1. An evidential breath alcohol test shall be invalid under the following circumstances:

   a. The EBT does not pass its next external calibration check. This invalidates all test results of 0.04 or greater on tests conducted since the last valid external calibration test. This would not invalidate any negative tests conducted.

   b. The BAT does not observe the minimum 15-minute waiting period prior to conducting the confirmation test.

   c. The BAT does not sign the breath alcohol testing form.

   d. The BAT fails to note in the remarks section of the form that the employee has failed or refused to sign the form following the recording or printing on or attachment to the form of the test results.

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ATTACHMENT 4

Re-Hire Certification and Agreement
Employees Returning from a Substance Abuse Counseling / Rehabilitation Program

I have completed a substance abuse counseling or rehabilitation program since _____ [date of policy violation at issue]. I seek re-employment with Shaw E&I, Inc. I agree that if I am re-hired, I will be subject to periodic unannounced testing for a period of twenty-four (24) months as a condition of my employment.

_____
Print Name Date

_____
Employee's Signature Date

_____
Employee's Social Security Number

_____
Shaw E&I, Inc., Personnel Date

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ATTACHMENT 5

Shaw E&I, Inc. Drug and Alcohol Non-DOT Policy
Puerto Rico Addendum

I. Puerto Rico Law

A. Possession

Under Puerto Rico law, **24 L.P.R.A. § 2404,** it is unlawful for any person knowingly or intentionally, to possess any controlled substance, unless such substance was obtained directly, or pursuant to a valid prescription or order from a practitioner, while acting in the course of his professional practice.

Any person who violates Puerto Rico law shall be guilty of a felony, and upon conviction thereof, shall be punished by imprisonment for a fixed term of three (3) years. Should there be aggravating circumstances, the fixed penalty established may be increased to a maximum of five (5) years; if there should be extenuating circumstances, it may be reduced to a minimum of two (2) years. The court, in its discretion, in addition to imprisonment, may impose a fine that shall not exceed five thousand (5,000) dollars and an administrative fee.

If such person commits said offense after one or more previous convictions under this subsection are final, he shall be guilty of a felony and, upon conviction thereof, shall be sentenced to imprisonment for a fixed term of six (6) years. Should there be aggravating circumstances, the fixed penalty established may be increased to a maximum of ten (10) years; if there should be extenuating circumstances, it may be reduced to a minimum of four (4) years.

If any person who has not been previously convicted of violating Puerto Rico law or any other law of the United States, related to narcotic drugs, marijuana, or stimulant or depressant substances, is found guilty of violating subsection (a) of this section, be it after a trial or entering a plea of guilty, the court, without entering a verdict of guilty, and with the consent of said person, may defer further proceedings and place said person on probation under such reasonable terms and conditions as it may require and for a fixed term of three (3) years. Should there be aggravating circumstances, the fixed penalty established may be increased to a maximum of five (5) years; should extenuating circumstances exist, it may be reduced to a minimum of two (2) years. The court shall advise the defendant that should he/she abandon the treatment and rehabilitation program, he/she shall be sanctioned pursuant to the provisions of § 4428 of Title 33.

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B. Manufacture and Distribution

Under Puerto Rico law it is unlawful for any person knowingly or intentionally:

(1) To manufacture, distribute, dispense, transport or conceal, or possess with the intent to manufacture, distribute, dispense, transport or conceal a controlled substance; or

(2) To produce, distribute, or dispense, transport or conceal, or possess with the intent to distribute or dispense, transport or conceal an adulterated substance.

Any person who violates this Puerto Rico law will be convicted of a felony and punished in accordance with the type of drug involved. Such punishment ranges from a sentence of a minimum of a fixed term of ten years to a maximum of a fixed term fifty years in prison. In addition, the court, in its discretion, may impose a fine, not to exceed fifty thousand (50,000) dollars and an administrative fee.

II. United States Law

Under the laws of the United States of America, it is unlawful for any person knowingly or intentionally:

(1) To manufacture, distribute, or dispense, or possess with intent to manufacture, distribute, or dispense, a controlled substance; or

(2) To import or export a controlled substance.

Any person who violates this law will be sentenced to a term of imprisonment ranging from 5 years to 40 years, and a fine of up to $20,000,000, depending on the type and quantity of the controlled substance or drug involved.

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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.

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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

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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.

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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

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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.

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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 orifice operator 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-

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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.

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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.

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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.

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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.

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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)

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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

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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

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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

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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?	

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PROCEDURE

Subject: EXCAVATION AND TRENCHING

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to describe the company requirements for excavation and trenching safety. These requirements are based on the federal Occupational Safety and Health Administration (OSHA) excavation standard found in 29 Code of Federal Regulations (CFR) 1926, Subpart P.

Some company activities are likely to occur in states or localities that either currently 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.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice 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

Accepted Engineering Practices
Those requirements or practices which are compatible with standards required by a registered professional engineer.

Angle of Repose
The greatest angle above the horizontal plane at which a material will lie without sliding.

Benching
A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Competent Person
An employee who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has the authority to take prompt corrective measures to eliminate them.

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

Excavation
Any man-made cut, cavity, trench or depression in an earth surface, including its sides, walls, or faces, formed by earth removal.

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Registered Professional Engineer
An individual currently registered as a professional engineer (preferably civil) in the state where work is to be performed.

Sheeting
Members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield
A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Shields may be pre-manufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields".

Shoring
Structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sloping
A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure and application of surcharge loads.

Support System
A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated Data
Tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench
A narrow (in relation to its length) excavation made below the surface of the ground. In general, the depth is greater than the width at the bottom, but the width of a trench at the bottom is not greater than 15 feet.

Type A Soil
Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, soil is NOT Type A if:

- The soil is fissured;
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects;

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- The soil has been previously disturbed;
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- The material is subjected to other factors that would require it to be classified as a less stable material.

Type B Soil
This classification refers to:

- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa)
- Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and, in some cases, silty clay loam and sandy clay loam.
- Previously disturbed soils except those which would otherwise be classified Type C soil;
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration;
- Dry rock that is not stable; or
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C Soil
This classification refers to:

- Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less;
- Granular soils including gravel, sand, and loamy sand;
- Submerged soil or soil from which water is freely seeping;
- Submerged rock that is not stable; or
- Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

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5.0 TEXT

5.1 Pre-Excavation Requirements

5.1.1 Underground Utilities. Prior to opening an excavation, the estimated location of underground utilities such as sewer, telephone, fuel, electric, water, or any other underground installation that may be reasonably expected to be encountered during the excavation work shall be determined.

Utility companies or a utility location service shall be contacted within the established pre-notification time, advised of the proposed work, and asked to deliniate the location of all underground utilities. Employees should be careful to protect and preserve the utility markings until they are no longer required for safe excavation. At least 3 feet of clearance between any underground utility and the cutting edge or point of powered excavation equipment will be maintained until the precise location of the utility is determined. Initial excavation within this 3 foot area will be conducted manually.

5.1.2 **Surface Encumbrances.** All surface encumbrances (trees, poles, boulders, etc.) that may create a hazard to employees shall be removed or supported.

5.1.3 **Vehicular Traffic.** Employees exposed to vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material. Traffic control devices (i.e., barricades, signs, cones, flagpersons, etc.) shall be specified and used in accordance with regulations applicable to the roadway or area in which excavation activities are occurring.

5.1.4 **Training.** Those who supervise the entry of personnel into an excavation must have completed a training course that included instruction in:

- Types of hazards associated with excavation operations;
- Safe work practices and techniques;
- A review of applicable Federal, state and local regulations; and
- A review of this procedure.

Employees who enter excavations are required to complete a site-specific training session to enable them to recognize unsafe conditions in and around the excavation. This training can be conducted during a tailgate safety meeting that emphasizes the specific excavation hazards that may be encountered.

Training documentation shall be maintained in the project file with a copy forwarded to the Knoxville Training Department.

As part of standard employee supervision process, training shall be complemented with on-the-job instruction and reinforcement of accepted practices to the extent necessary to assure compliance with this procedure and all other applicable regulations.

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5.2 Excavation Work Practices

5.2.1 **General.** Each employee working within an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with 29 CFR 1926 Subpart P, except when the excavation is made entirely in stable rock or when the excavation is less that 5 feet deep and examination of the ground by a competent person provides no indication of a potential cave-in. A competent person shall ensure that protective systems, when required, are installed and maintained per the design specifications.

No employees shall be permitted to enter an excavation unless it is absolutely essential to do so and all requirements of this procedure are met.

5.2.2 **Supervision.** Work in an excavation shall at all times be supervised by a competent person. This individual will remain outside of the excavation at all times, and will be responsible for identifying any unusual developments above ground which may warn of impending earth movement.

5.2.3 **Soil Classification.** Based on the results of tests described in Attachment 3, the competent person will classify each soil/rock deposit as stable rock, Type A, Type B, or Type C. When layers of soil/rock exist, the weakest layer will be classified; however, each layer may be classified individually when a more stable layer lies under a less stable layer. If the properties or conditions of a soil/rock deposit change in any way, re-evaluation will be required.

5.2.4 **Access and Egress.** Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 or more feet in depth so as to require no more than 25 feet of lateral travel for employees.

5.2.5 **Protective Systems.** Protective systems shall be designed in accordance with 29 CFR 1926.652(b) or (c) and shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

5.2.6 **Exposure to Falling Loads.** No employees shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by spillage or falling materials. Operators may remain in the cabs of vehicles being

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loaded or unloaded provided the vehicles are equipped with a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

5.2.7 **Warning System for Mobil Equipment.** When mobile equipment is operated adjacent to an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs.

5.2.8 **Hazardous Atmospheres.** Where an oxygen deficient (less that 19.5% O_2) or hazardous atmosphere exists, or could reasonably be expected to exist, the excavation shall be tested before employees enter. Testing shall be conducted as often as necessary to ensure that the atmosphere remains safe. Some excavations may be considered confined spaces which require compliance with Shaw E & I Procedure HS300.

Adequate precautions shall be taken to prevent employee exposure to oxygen deficient or hazardous atmospheres. As appropriate, ventilation and/or respiratory protective devices shall be used.

5.2.9 **Water Accumulation Hazards.** Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. If water is controlled or prevented from accumulating by the use of water removal equipment, the process shall be monitored by a competent person to ensure proper operation.

If the excavation work interrupts the natural drainage of surface water (streams, run-off channels), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to run-off from heavy rains shall be regularly inspected by a competent person.

5.2.10 **Stability of Adjacent Structures.** Structures adjoining an excavation shall be evaluated to assess their stability. Excavation below the level of the base or footing of any foundation or retaining wall that could reasonably be expected to pose a hazard to employees shall only be permitted when:

- A support system (underpinning) is provided to ensure the safety of employees and the stability of the structure;
- The excavation is in stable rock;
- A registered professional engineer has determined that the structure will be unaffected by the excavation; or
- A registered professional engineer has determined that such excavation will not pose a hazard to employees.

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Sidewalks, pavements and other surface structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

5.2.11 **Protection from Loose Rock or Soil.** Employees shall be protected from loose rock or soil which could fall or roll from the excavation face or edge. Such protection could consist of scaling to remove loose materials, or the installation of protective barriers. All spoil shall be placed at least 2 feet from the edge of the excavation. It is strongly recommended that spoil be placed 4 or more feet from the excavation edge so as not to cover surface indicators of subsidence (such as fissures or cracks).

5.2.12 **Inspections.** The competent person shall make daily inspections of excavations, adjacent areas, and protective systems for evidence of conditions that could result in a cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. The inspection shall be made prior to start of work, and as needed throughout the shift. Inspections shall be made after each rainstorm or other hazard-increasing event and will be documented using Attachment (2).

Where the inspection finds evidence of any hazardous condition, exposed employees shall be immediately removed from the hazardous area until necessary precautions have been taken.

5.2.13 **Fall Protection.** Where employees or equipment are permitted to cross over excavations, walkways or bridges shall be provided. Standard guardrails shall be provided where walkways are 6 feet or more above lower levels.

Adequate barriers or other types of physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered and shall be backfilled as soon as possible.

6.0 EXCEPTION PROVISIONS

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

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7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS050 Training Requirements
HS051 Tailgate Safety Meetings
HS300 Confined Spaces
29 CFR 1926 Subpart P - Excavations

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Excavation Inspection
3. Soil Classification Worksheet
4. Selection of Protective Systems for Excavations 20 Feet or Less in Depth
5. Sloping Options
6. Shoring or Shielding Options

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ATTACHMENT 1
EXCAVATION AND TRENCHING

Responsibility Matrix

Action	Procedure Section	*Responsible Party*					
		Employee	Supervisor	Registered Professional Engineer	VP Health and Safety	Local H&S Representative	Competent Person
Incorporate state, local, or client-specific excavation requirements into project plans.	1.0					X	
Issue, revise, and maintain procedure	3.1				X		
Coordinate identification of underground utilities.	5.1.1						
Determine need for traffic control devices.	5.1.3		X				
Participate in excavation training.	5.1.4	X				X	X
Ensure that protective systems are installed and maintained.	5.2.1						X
Classify Soil Type	5.2.3						X
Design Structural Ramps	5.2.4						X
Selection and design of protective system(s)	5.2.5			X			
Determine stability of adjacent structures.	5.2.10			X			
Inspecting excavation for hazardous conditions	5.2.12	X	X				X

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ATTACHMENT 2
EXCAVATION INSPECTION

THIS INSPECTION IS TO BE COMPLETED BY THE COMPETENT PERSON EACH DAY THAT EMPLOYEES WILL BE ENTERING AN EXCAVATION.

Project Name: _____ Project No.: _____

Date: _____ Time: _____ Competent Person: _____

Soil Classification (see Soil Classification Worksheet): _____

Excavation Depth: _____ Excavation Width: _____

Type of Protective System Used: _____

	☒ YES	NO	N/A
1 GENERAL:			
Surface encumbrances removed or supported			
Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the			
Hard hats, steel-toed boots, and safety glasses worn by all employees.			
Spoils, materials, and equipment set back at least 2 feet from the edge of the excavation.			
Walkways over excavations 6 feet or more above lower levels are equipped with standard guardrails.			
Warning vest or other highly visible clothing provided and worn by all employees exposed to public			
Employees required to stand away from vehicles being loaded or unloaded.			
Warning system established and utilized when mobile equipment is operating near excavation edge.			
Employees prohibited from going under suspended loads.			
2 UTILITIES:			
Utility companies contacted and/or utility locations delineated.			
Underground installations protected, supported, or removed while excavation is open.			
3. MEANS OF ACCESS AND EGRESS:			
Lateral travel to means of egress no greater that 25 feet in trench excavations 4 feet or more in depth.			
Ladders used in excavations secured and extended 3 feet above the edge of the trench.			
Structural ramps used by employees designed by a competent person.			
Structural ramps used for equipment designed by a registered professional engineer.			
4. WET CONDITIONS:			
Precautions taken to protect from the accumulation of water.			

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Water removal equipment monitored by a competent person.			
Surface water or runoff diverted or controlled to prevent accumulation in the excavation.			
Inspections made after every rainstorm or other hazard-increasing occurrence.			
5. HAZARDOUS ATMOSPHERE:			
Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficient, combustible, or otherwise hazardous atmosphere.			
Adequate precautions taken to protect employee from exposure to a hazardous atmosphere.			
Testing conducted to ensure that the atmosphere remains safe.			
Emergency equipment, such as breathing apparatus, safety harness and line, and basket stretcher readily available where hazardous atmosphere does exist.			
6. SUPPORT SYSTEMS:			
Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.			
Materials and equipment used for protective systems inspected and in good condition.			
Damaged materials and equipment used for protective systems inspected by a Registered Professional Engineer after repairs and before being placed back into service.			
Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or from being struck by materials or equipment.			
Members of support systems securely fastened to prevent failure.			
Support systems provided to insure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.			
Excavations below the level of the base or footings approved by a registered professional engineer.			
Removal of support systems progresses from the bottom, and members are released slowly as to note any indication of possible failure.			
Excavation of material to a level of greater that 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.			
Shield system placed to prevent lateral movement.			
Employees are prohibited from remaining in shield system during vertical movement.			
7. REMARKS:			

_____

_____

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ATTACHMENT 3
SOILS CLASSIFICATION WORKSHEET

The following worksheet outlines the visual and manual tests that the competent person must perform at least once, and each time soil conditions change. At least one visual and one manual test must be performed; however, performing several tests is recommended so that the condition of the excavation is thoroughly examined.

Project Name: _____ Project Number: _____

Date: _____ Time: _____

Where was the sample taken from? _____

I.	VISUAL TESTS: *One or more visual tests are required for each classification and each time conditions change.*		
1.	Estimate range of particle sizes:	a. primarily fine-grained = cohesive material b. primarily coarse-grained = granular material	
2.	Observe excavated soil:	a. clumps = cohesive material b. breaks up easily = granular material	
3.	Observe sides and adjacent surface area of opened excavation:	a. crack like openings = fissured material b. soil spalls off vertical sides = possible fissured material	
4.	Previous excavation activities:	a. previously disturbed soil	b. not previously disturbed soil
5.	Observe opened side of excavation:	a. layered systems c. estimate degree of slope of layers: _____	b. layers sloped towards excavation _____
6.	Water condition:	a. evidence of surface water c. depth of water table _____	b. water seeping from sides _____
7.	Vibration present:	a. area adjacent to excavation	b. area within excavation

II.	MANUAL TESTS- *One or more manual tests are required for classification and each time soil conditions change.*	
1.	Plastically- soil is cohesive if following is true:	a. mold soil samples into a small ball b. roll ball into thread ⅛" diameter c. pick up 2" length of ⅛" thread by one end without breaking
2.	Dry Soil Strength:	a. crumbles on its own or with moderate pressure = granular b. falls into clumps which break into smaller clumps that are only broken with difficulty = clay with gravel, sand, or silt. c. breaks into clumps which do not break into smaller clumps and can only be broken with difficulty with no visual indication of fissures = unfissured.
3.	Thumb penetration test: *(These tests are to be run on a large clump of material as soon as it is excavated.)*	a. can be easily indented by the thumb but penetrated by thumb only with great effort Type A b. easily penetrated several inches by thumb and molded by light finger pressure = Type C
4.	Unconfined Compressive Strength: *(Saturated Soil Needed)*	a. Pocket Penetrometer reading (take 10 readings and average) 0 - 0.5 = Type C. 0.5 - 1.5 = Type B, 1.5 - 2.0 = Type A b. Shear Vane reading X2: 0 - 0.5 = Type C, 0.5 - 1.5 = Type B, 1.5 - 2.0 = Type A
5.	Drying Test: *(A dry soil sample 1" thick X 6" diameter is needed)*	a. develops cracks = fissured material b. dries without cracks and breaks by hand with considerable force significant cohesive content = unfissured cohesive material. c. sample breaks easily by hand = fissured cohesive or granular material d. easily pulverize dry clumps by hand or by stepping on them = granular e. don't pulverize easily = fissured cohesive.

SOIL CLASSIFICATION: Type A Type B Type C Stable Rock Other _____

COMPETENT PERSON: _____ Print Name _____ Signature _____ Date

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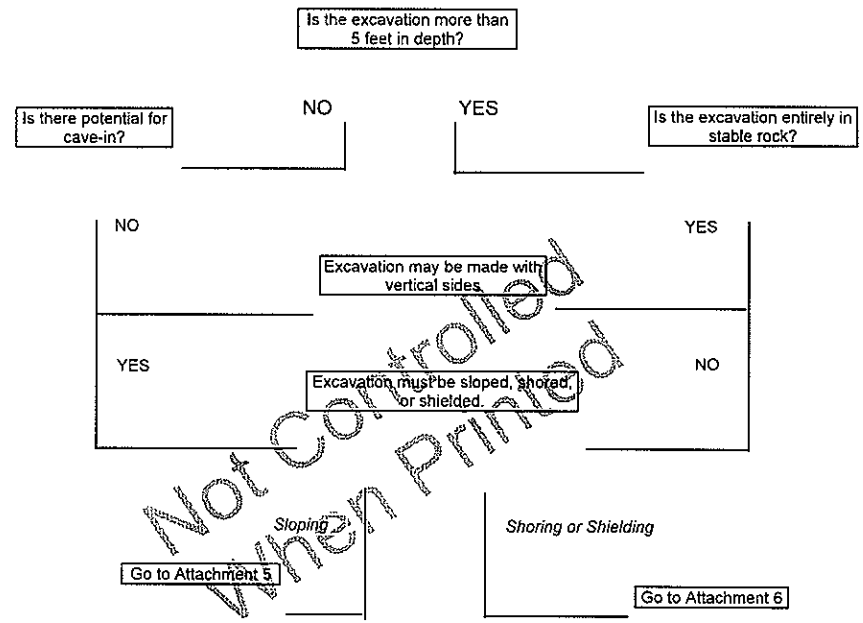
ATTACHMENT 4

SELECTION OF PROTECTIVE SYSTEMS FOR EXCAVATIONS 20 FEET OR LESS IN DEPTH



For excavations greater than 20 feet in depth, design by a registered professional engineer in compliance with 1926.652 (b) and (c) is required.

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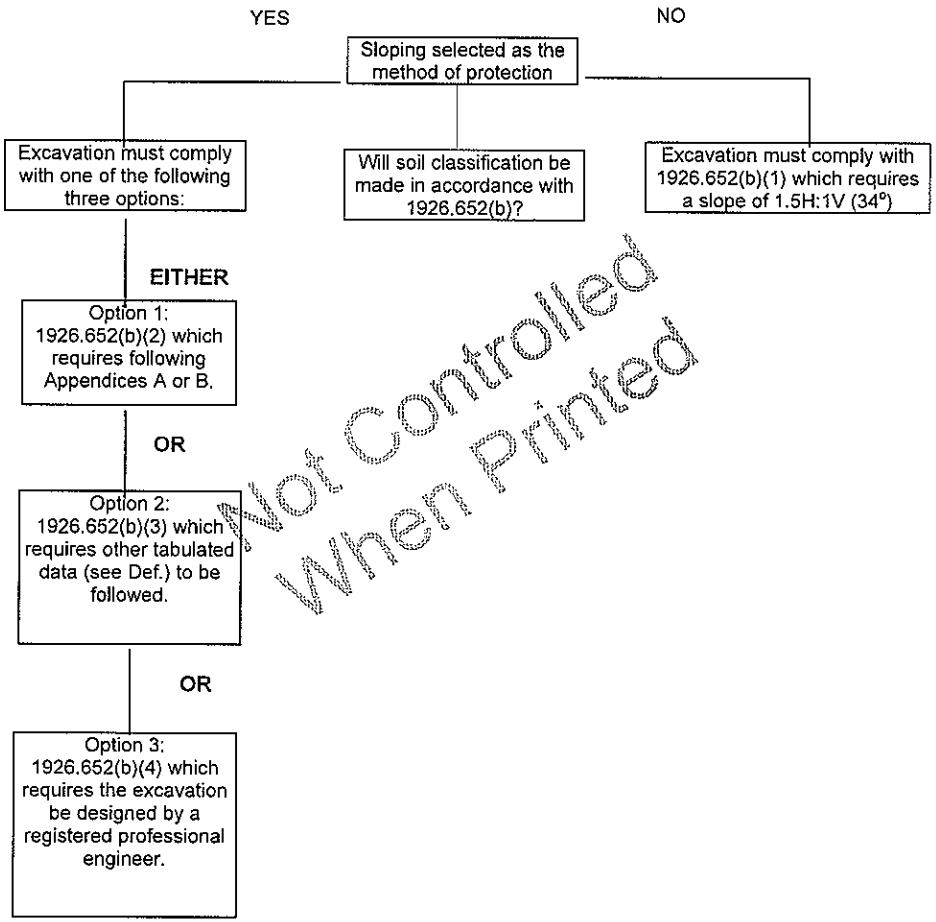
ATTACHMENT 5
OPTIONS

SLOPING



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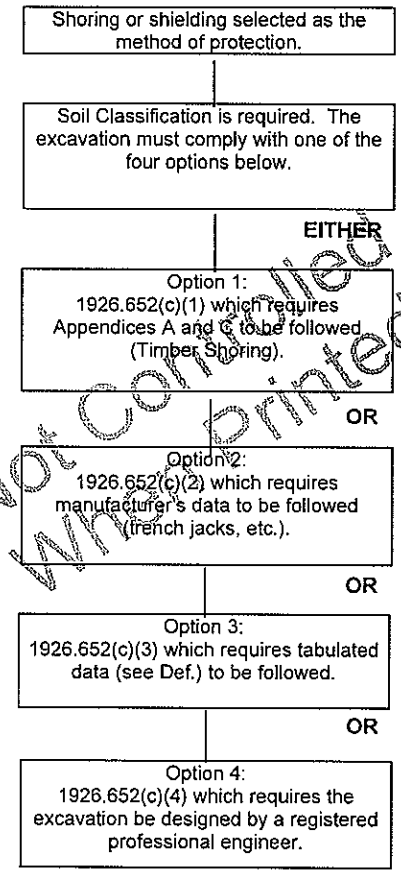
ATTACHMENT 6
SHORING OR SHIELDING OPTIONS



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PROCEDURE

Subject: UNDERGROUND/OVERHEAD UTILITY CONTACT PREVENTION

1.0 PURPOSE AND SUMMARY

This procedure prescribes the steps to be followed in order to prevent accidents involving the contact with or damage of underground/overhead utilities. The company provides the operational and training practices required to safely execute work where underground/overhead utility hazards may exist.

2.0 TABLE OF CONTENTS

1.0 Purpose and Summary
2.0 Table of Contents
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- 5.4 Incident Reporting Requirements
- 5.5 Local Jurisdiction Requirements

6.0 Exception Provisions
7.0 Cross References
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3.0 RESPONSIBILITY MATRIX

3.1 **Procedure Responsibility**
The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure. Also, see Attachment 1 for matrix of responsibilities.

3.2 **Action/Approval Responsibilities**
The Responsibility Matrix is Attachment 1.

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4.0 DEFINITIONS

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

Competent Person – Drilling Oversight (CPDO) Training
When drilling activity is to take place the Shaw's Field Team Leader (FTL) must have successfully completed Shaw's in-house training pertinent to competent person drilling oversight (CPDO Training). The FTL is required not only to have successfully completed CPDO training but to have an appropriate educational background, coupled with field experience and, the authority to make changes to correct deficiencies, or to stop the job if need be.
NOTE: The CPDO training requirement will become effective September 1st 2006. This means that every FTL will have successfully completed CPDO Training prior to August 31, 2006.

Competent Person - Excavation and Trenching
A person who is capable of identifying existing and predictable hazards in the excavation/trenching work area and who has the authority to take prompt corrective measures to eliminate them. NOTE: Excavation/trenching training is required when trenching/excavation hazards are present/anticipated (i.e. spoil piles, use of three foot (3') or larger diameter augers, or other circumstances) but only recommended when trenching/excavation hazards are not present/anticipated.

Excavation
Any manmade cut, cavity, trench or depression in an earth surface formed by earth removal.

Underground Utility
Any active or inactive subsurface or buried structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following:

- Electric power lines
- Natural gas lines
- Telephone lines
- Telephone cables and fiber optic lines
- Water lines
- Steam and pneumatic lines
- Sewer lines
- Drain lines
- Underground storage tanks
- Septic tanks
- Process or product lines

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Overhead Utility
Any active or inactive overhead structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following:

- Overhead power lines
- Overhead telephone lines
- Overhead fiber optic lines
- Overhead cables
- Overhead supports
- Overhead piping
- Traffic lights
- Utility Bridges

One Call Center
Each state has a One Call, Dig Safe, Miss Dig, etc. dial-in number for requesting mark-out of buried public utilities, such as gas lines, electrical lines, telephone/cable lines, sewer lines, and water lines. This number is typically called a minimum of 72 hours prior to subsurface activities depending on the particular state the work will be conducted. The One Call Center will notify the local public utilities for a line location mark-out for the particular location. The individual public utilities must locate and mark-out the utilities upon request. In most cases, the markouts will not be performed on private property. A confirmation number is established and confirmation report generated and submitted to the requester.

As-Built Drawings
As-built drawings are blueprints that are usually obtained from the facility owner or client. They show original buried utilities and any modifications which have been made.

Private Utility Locating Service
A private utility locating service is a firm established to locate underground utilities using specialized locating equipment, such as ground penetrating radar location devices or radio transmitter type utility locating equipment.

Fiber Optic Service Lines
Fiber optic service lines are communication lines that are buried underground. When damaged, these lines are very expensive to replace. Fiber optic companies routinely provide on-site supervision, if requested. The company encourages this practice.

Field Team Leader (FTL)
The FTL is the person with whom the responsibility of the execution of the field work resides. This person may be the project manager, senior geologist, staff geologist, etc. This individual must have the sufficient experience, training and, field knowledge to ensure all site configuration information is collected and analyzed.

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Site Survey
A site survey is an inspection of the work site to look for signs of other buried utilities that may not be indicated through as-built drawings or through utility locating services. The survey typically involves inspection of overhead electrical services, inspection of basements, utility rooms, garages, etc., for signs of old electrical conduits or fuel/water/septic lines. The FTL must contact the appropriate site representative to provide any additional information that may be marked on the as-builts.

5.0 TEXT

Underground/overhead utilities may be encountered at any job site. The guidelines established in this procedure were developed to help identify and mitigate the potential hazards associated with this type of work.

Any subsurface activity is subject to the underground utility locating regulations for the state where the work will be conducted. This procedure authorizes the use of state, local or other required practices, but requires that the practice which most limits the liability to Shaw for damaged utilities is utilized. No variance is required under these circumstances, but the project-specific Health and Safety Plan (HASP) or work plan shall fully document these more protective procedures.

5.1 Preliminary Requirements

The Project Manager or designee must visit the site to mark the boring/excavation locations so they can be clearly identified and then contact the One Call Center for the state in which the work is to be performed in to formally request a utility mark out at the particular work location(s).

Prior to assignment of work the Field Team Leader (FTL) will assure that all affected employees receive an overview of the hazards of encountering underground/overhead utilities. The FTL is responsible to review this procedure, the work practices to control these hazards, and the roles and responsibilities of each worker with the work crew. This procedure and other requirements that may be contained in the site specific HASP shall be reinforced during daily tailgate safety meetings.

5.2 Operating Requirements

5.2.1 Underground Utilities Requirements

Prior to conducting any project site activities, the FTL must ensure that all existing underground/overhead utilities in the work area are located per the state or local mark-out protocols. Documentation of utility mark-out must be completed using the Utility Mark-out Documentation form (Attachment 3). No boring/excavation work is to be performed until all utility mark-outs are verified.

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While on-site, the FTL must conduct a site survey to search for signs of other buried or overhead utilities. This will include areas such as garages, basements, etc. The results of such surveys must be documented on the Utility Markout Documentation form (Attachment 3). The property owner, client, or facility operator must be consulted on the issue of underground utilities. All knowledge of past and present utilities must be evaluated prior to conducting work..

After all mark outs have been completed, and the boring locations have been accepted by the FTL prior to drilling, each borehole location must be hand dug to a minimum of five feet bgs.

If the investigation requires boreholes in an area not covered by a municipal one call system (on private property), then the FTL must utilize appropriate geophysical techniques, hand held utility locating devices, a private utility locating firm, or other approved method to determine the locations of underground utilities. The current accepted geophysical methods for the investigation and location of buried utilities include: Ground Penetrating Radar (GPR), Time Domain and/or Frequency Domain Electromagnetic methods, Magnetometer, and Inductive/Conductive Radio-Magnetic methods. The geophysical methods can be very useful for locating buried utility lines in areas where hand digging is not possible or practical. However, it must be noted that these methods do have limitations that are a function of soil conditions, depth of investigation, imaging resolution, or other factors.

If it is determined that a non-invasive geophysical investigation may be needed, assistance with selecting the appropriate method(s) can be obtained from the Shaw E & I Science and Technology Division, Geophysics & Mapping Group, and a variance request must be submitted and approved prior to the inception of intrusive field activity.

Should the local geology be prone to refusal or should there be any other reason the boring location cannot be cleared to a minimum of 5' bgs then the appropriate aforementioned alternative methods should be utilized to ensure the boring location is clear of utilities 5' bgs, and a variance request must be submitted for review.

5.2.2 Overhead Utilities Requirements

Overhead utility locations must be marked (warning tape, flags, etc.) where heavy equipment, or other equipment, has the potential for contacting overhead utilities. Conduct a site inspection on a daily basis to determine where activities will take place and the location of overhead utilities and overhead obstructions. Once they have been identified, place warning tape on poles and/or guy wires and attempt to plan the work so that no contact will be made with the overhead utilities or obstructions. Share the information with all site personnel during the tailgate safety meeting.

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Maintain at least 10 feet from overhead power lines, up to 50 kV. For voltages over 50 kV, add 0.4 inches per kV to obtain the safe distance between equipment and power lines. If voltage is unknown, remain at least 20 feet from overhead power lines.

As a precaution, a spotter must be used at all times when it is possible to violate the minimum distance requirements for overhead utilities. If contact is deemed unavoidable, consult with the client and the respective health and safety representative to evaluate the area to determine if the particular overhead utility can be removed prior to engaging in the activity.

5.2.3 Other Requirements

Only hand digging is permitted within 3 feet of underground high voltage, product or gas lines. Once the line is exposed heavy equipment can be used but must remain at least 3 feet from the exposed line.

Only experienced, demonstrably proficient equipment operators will be used to operate such heavy equipment as drill rigs, backhoes, front-end loaders, cranes, etc.

Due the sensitivity and costs associated with damage to fiber optic cables the FTL must have documented verbal contact and an agreement with the fiber optic company for all work within 50' of the fiber optic cables. Subsurface investigations near fiber optic cables are more fully discussed in site specific HASP's. Contact your division Health and Safety Professional for specific information on this subject.

5.3 Training Requirements

Competent Person Drilling Oversight (CPDO) Training

The FTL (at least one onsite Shaw person will be performing the drilling oversight) will be required to have successfully completed the approved internal Competent Person Drilling Oversight (CPDO) training.

Prior to assignment of work the Field Team Leader (FTL) will assure that all affected employees receive an overview of the hazards of encountering underground/overhead utilities. The FTL is responsible to review this procedure, the work practices to control these hazards, and the roles and responsibilities of each worker with the work crew. This procedure and other requirements that may be contained in the site specific HASP shall be reinforced during daily tailgate safety meetings.

Trenching/Excavation Training

The Field Team Leader or at least one onsite Shaw employee will be required to have successfully completed Trenching/Excavation training prior to the inception of site work activity when trenching excavation hazards (i.e. spoil piles, use of 3' diameter augers, or anytime similar hazards are present) are present/anticipated. NOTE: This training is now recommended rather than required when trenching/excavation hazards are NOT anticipated/required

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5.4 Incident Reporting Requirements

Employees are required to immediately report to their direct supervisor any overhead or underground utility contact incident, or near miss incidents. Any supervisor (but preferably the supervisor directly responsible for the involved employees) with first-hand knowledge of an incident is required to investigate the incident. The Project Manager and respective Health and Safety Manager or Representative shall be informed of the incident immediately.

At a minimum, the incident investigation will require completion of the incident investigation report and General Liability Property Damage and Loss Report form found in H&S Procedure HS020.

In addition, Attachment 5 provides a "Tip Sheet" to help properly assess and investigate the incident causes and recommendations or requirements.

5.5 Local Jurisdiction Requirements

Where local jurisdictions or clients have established requirements different from those in this procedure, the practice which most limits the liability to Shaw for damaged utilities shall be utilized. No variance is required under these circumstances but the project-specific Health and Safety Plan or work plan shall fully document the alternate procedures.

6.0 EXCEPTION PROVISIONS

Anytime a minimum of a 5' clearance cannot be obtained by either hand digging or by using geophysical means, the FTL must obtain a variance from the Regional VP (or equivalent level such as Operations Director for Federal Business Line) or designee to proceed with drilling operations in that area. This would include an initial verbal variance documented in the field log followed up by a written (email) approval from either the Regional VP (or equivalent level or title) or designee. The record of communication will be noted in the field log for the project and, a record of the approval or denial will be placed in the project file.

A variance form can be obtained in HS 013. A flowchart to assist one in determining how and when a variance should be obtained can be found immediately following this section.

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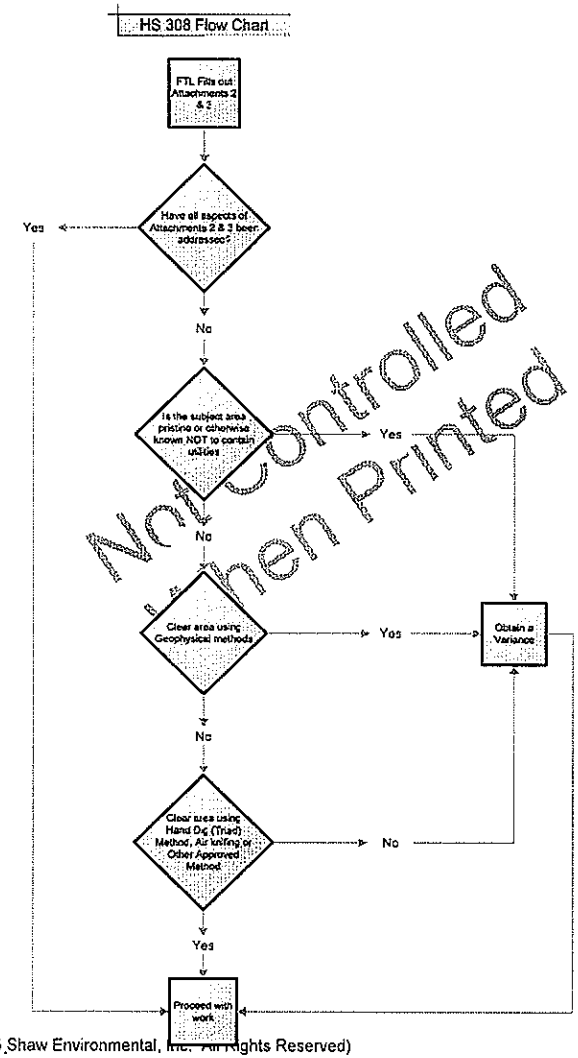

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7.0 CROSS REFERENCES

HS013	Health and Safety Procedure Variances
HS020	Accident Prevention Program: Reporting, Investigation, and Review
HS050	Training Requirements
HS307	Excavation and Trenching

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Pre Drilling Checklist
3. Utility Markout Documentation
4. Underground Utility Hits – Tip Sheet for Incident Investigations
5. Frequently Asked Questions

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ATTACHMENT 1 - UNDERGROUND/OVERHEAD UTILITY CONTACT PREVENTION
Responsibility Matrix

Action	Procedure Section	Vice President	Project Manager	Field Team Leader	HS Representative
Project-specific HASP or Work Plan shall document the practices to be used at a particular site.	1.0		X	X	X
Contact the One Call Center for mark out of utilities at the site	5.1		X		
Complete Utility Markout Documentation Form	5.2		X	X	
As-built drawings shall be reviewed	5.2			X	
Only experienced demonstrably proficient equipment operators will be used to operate such heavy equipment as backhoes, front-end loaders, cranes, etc.	5.3				
Provide training*	5.3				
Incident Investigation and Reporting	5.4		X	X	X
Exceptions to Procedure	6.0	X	X	X	X

*Provided by Shaw's Training Department

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ATTACHMENT 2 - PRE - DRILLING/BORING/GEOPROBE Checklist

Purpose: This form is designed to help the FTL make decisions drilling/boreholing/geoprobing around underground/overhead utilities.

DATE_____ PROJECT NAME/NUMBER_____
Field Team Leader Name: _____
DURATION/SUMMARY OF WORK TO BE PERFORMED: _____
_____

Consideration	Check	Check	Explanation	Initial
Has the state one-call been contacted?	□ Yes	□ No		
Are any as-built drawings available? If so, do they show any utilities?	□ Yes	□ No		
Has a visual inspection of the work area(s) been completed?	□ Yes	□ No		
If one-call not available has a private locating service or Shaw S&T group been contacted?	□ Yes	□ No		
Were any utilities identified through private locating service? If so, indicate on site drawings.	□ Yes	□ No		
Are there any fiber optic cables within 50 feet of hole locations?	□ Yes	□ No		
If fiber optic cables are within 50 feet has an agreement with the fiber optic company been established?	□ Yes	□ No		
Can a test borehole be advanced by hand digging, probing, post hole digging, and/or air knifed to 5 feet bgs?	□ Yes	□ No		
If hand digging, probing, post hole digging, and or air knifing to 5 feet bgs is not possible, can a non-invasive geophysical investigation be conducted? If not, why?	□ Yes	□ No		
Are you comfortable with approving this authorization?	□ Yes	□ No		
Other considerations:				

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ATTACHMENT 3 - UTILITY MARK-OUT DOCUMENTATION

Project Name:_____ Location:_____
FTL Name: _____ Date:_____
Utility Called:_____ Confirmation #:_____
Subcontractor:_____ Task/Activity:_____
County of work:_____ Municipality of work:_____
_____

Before work is done on any site, contact the appropriate local utility locating service (One Call, Miss Dig, Uloco, etc.) or a local utility contractor to have sub grade utilities marked. NOTE: Boring locations to be placed not in the public right of way are typically not marked out by the public utility mark out, and a private utility locate service must be engaged. Indicate to the utility locator the nearest intersecting street for the site: _____ Confirmation No:_____.

List utility firms (public and private) and the utility they will mark.

Utility Marker Emergency Telephone Numbers Major Utilities Marked by Color Code			
Name of Utility Company	**Utility**	**Color Code**	**Emergency Telephone Number**
	Water	Blue	
	Gas	Yellow	
	Electric	Red	
	Telephone/ Cable/ Communication	Orange	
	Sewer	Green	

"ALL UNDERGROUND UTILITIES MAY NOT BE LOCATED BY THE LOCAL UTILITY SERVICE". Accordingly, you must list other known utilities in the area that the "One Call" service will not contact:

Attach photos of the area prior to placing boreholes.
Take photos of the area indicating minimum 5' hand dig, post hole dig, probe, GPR or other:
NOTE: For any borehole, should 5' minimum clearance not be obtained, you must contact Business Line VP or equivalent (Operations Director or other on the Federal Business Line) and obtain a variance.

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Completed by:_____ _____ _____
Name Signature Date

ATTACHMENT 3 – UNDERGROUND UTILITY HITS TIP SHEET FOR INCIDENT INVESTIGATIONS

1. Location of the incident.
2. The time of day the incident occurred.
3. What type of utility was hit?
4. How deep was the line hit (in feet)?
5. Who called Designated Locator Service?
6. Note the "One Call" number on the Incident Investigation Follow-up report.
7. Attach the "One Call" record keeping documentation.
8. Were mark-outs completed by the utilities? If so, please identify.
9. Were mark-outs legible at the site?
10. Was the mark-out of the line that was hit accurate?
11. Was the mark-out misinterpreted?
12. Is there a utility damage sheet attached to the Incident Investigation Follow-up Report?
13. Have there been any faults or oversights by any 3rd party? If so, is it documented on the Incident Investigation Follow-up Report?
14. Did the FTL interview the property owner/manager prior to the incident?
15. Was pre-screened by hand digging 5 feet?
16. Were any supplemental utility locator devices used? If so, did we obtain them? If so, were they used on site?
17. Were there blueprints/as built plans available? If so, did we obtain them? If so, were they used on site?
18. Who is paying for the repairs?
19. Please define the total hours and cost estimate/impact to address the utility damage incident:

    _____ Site time in hours (not billed to the job)
    _____ PM time hours (not billed to the job)
    _____ H&S time in hours (not billed to the job)
    _____ Bill Time in hours (not billed to the job)
    _____ Rework/non-billable time (estimate)
    _____ Subcontractor rework/non-billable costs (estimate)
    _____ Repair costs to company (estimate)
    _____ Repair cost to customer (estimate)

20. Has the FTL completed Shaw's in-house CPDO training?
21. Has the FTL completed trenching/excavation training?
22. Is he/she current with the OSHA 40 hour and 8 hour refresher? If so, what are the dates of the training?
23. Who was the Site Safety Officer on the job site?
24. Does he/she have OSHA 8 hour supervisor training? If so, what are the dates of the training?
25. What was the name of the drilling subcontractor that was on site?
26. Have we researched the training background for this vendor?
27. Was a JSA performed at least once during the day that covered utility contacts and associated hazards?
28. Does this vendor have approved status?
29. Was there a tailgate safety meeting that took place?
30. Were utility mark-outs addressed at the tailgate safety meeting?
31. Were there any markings nearby the "hit" area?

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ATTACHMENT 5 – Frequently Asked Questions (FAQs)

During the roll-out of this revision of HS 308 a variety of questions/comments/concerns arose. These concerns have been put in the form of most frequently asked questions (FAQs) and their respective responses. These FAQs will clear up misunderstanding pertaining to this procedure, and provide valuable information that will help our workforce have a better understanding of how this procedure should be implemented. Please review the FAQs below:

1. *No other competitor of Shaw has felt the need to do anything as extreme as this procedure to ensure minimization of utility hits. Instituting this procedure will put us out of business.*

Response: After thorough review of claims and incidents involving drilling activities and underground utilities, the committee believes that our business/client needs are best served by adopting this policy. And that the likelihood of being put out of business is much greater from continuing to do business the way we currently do it than by adopting this improved policy. The committee realized that 100% adherence to this procedure at all work sites is likely not possible. For those cases where legitimate reasons exist for non-compliance, the committee realized that an effective responsive (variance) system must be in place. The committee believes that the variance procedure, as stated in the policy, should address the exceptions as they occur.

The Committee is not aware of any specific ASTM or true "industry standard". However, the committee is aware that best practices can vary tremendously and many times are client dependent. For example one extremely large Shaw client requires that we continuously probe. On the other end of the spectrum some clients look completely to Shaw for guidance in these matters.

2. *Our clients want us to do the work but do not wish to pay the additional fees involved with this new procedure. Could we offer them a two tiered pricing, one to do it the old way, and one to do it the new way?*

Response: The committee believes that contacting an underground utility of any type, no matter who is at fault or who ultimately pays for fixing, the outcome is a "black eye" for all involved. When these events occur, even if Shaw is not at fault, the committee believes that continued good client relations, and the potential for obtaining future business lessens as utility hits/incidents occur. This procedure is designed to minimize health and safety risks to our workers AND to mitigate liability to Shaw. Receiving the necessary compensation for the precautionary measures outlined in the procedure would be expected, and should be itemized in the initial proposal including a statement as to what will specifically be done in the field to mitigate risks relative to underground utilities and WHY Shaw believes these steps are necessary. However, if the client is willing to assume the entire liability resulting from "hitting" an underground utility, the contract should be written to reflect this

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and a variance would be in order. Keep in mind that Shaw cannot allow a client's desires to take on liability to affect the health and safety of workers. No matter what the client desires might be, Shaw would still expect the basic procedures to be followed for health and safety purposes. The training though yet to be finalized will provide project manager's examples of wording to be used in proposals and contracts.

3. *Hand digging to 5' is impossible during frost conditions in Minnesota, Wisconsin and many northern areas. How should this be addressed?*

Response: When conditions present themselves that do not allow for hand digging each borehole, other methods must be used for clearance and a variance must be obtained. The alternative methods include a range of non-invasive geophysical survey techniques designed specifically for locating buried utilities, pipelines, tank (UST), and other buried objects that can interfere with drilling. These non-invasive geophysical methods are suggested and mentioned in the procedure.

4. *What if the field crew runs into refusal during hand dig clearance?*

Response: If refusal occurs and moving to an alternate spot presents the same problem, hand digging may not be possible as mentioned in #2 above. When conditions present themselves that do not allow for hand digging each borehole, other methods must be used for clearance and/or a variance must be obtained. Of course, we expect that the dig-safe folks to be contacted, and that a private locating service be utilized if available. Should a private locating service not be available, we can use trained internal sources.
The alternative methods include a range of non-invasive geophysical survey techniques designed specifically for locating buried utilities, pipelines, tank (UST), and other buried objects that can interfere with drilling. The current accepted geophysical methods for the investigation and location of buried utilities include: Ground Penetrating Radar (GPR), Time Domain and/or Frequency Domain Electromagnetic methods, Magnetometer, and Inductive/Conductive Radio-Magnetic methods. These non-invasive geophysical methods are suggested and discussed in the procedures. The geophysical methods can be very useful for locating buried utility lines in areas where drilling and digging are not possible or practical, but these methods do have some limitations that are a function of soil conditions, depth of investigation, and imaging resolution.
If it is determined that a non-invasive geophysical investigation may be needed, assistance with selecting the appropriate method(s) can be obtained from the Shaw E & I Science and Technology Division, Geophysics & Mapping Group. Of course, it is expected that the "dig safe" folks will be contacted, and that a private utility locating service be utilized when appropriate (utility location method is known to be feasible), and if available. Should a private locating service not be available, we can use trained internal Shaw E & I personnel resources to perform utility line location work. Finally, if the Project Manager has determined that a variance to the procedure is justified, a variance request should be submitted for review.

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5. *Why is trenching/excavation training required for putting in Geoprobe® boreholes? This seems like tremendous overkill.*

Response: The committee believes that, in general, trenching/excavation training is a good educational tool that promotes overall health and safety awareness and provides important information/techniques for our field staff. Trenching/excavation training provides insights into fall hazards, spoil pile placement, and many other related safety issues. Many of our drilling jobs have involved oversized auger bits (3' in diameter) where a large deep borehole is created. The committee agrees that when the diameter of the borehole lessens (i.e. use of a Geoprobe®), the impact of trenching/excavation training decreases. Trenching excavation training is now a requirement only when large boreholes are created or other hazards as mentioned above are present, but only recommended training when Geoprobe ® or similar equipment is being used and the result is trenching excavation type hazards do NOT exist. NOTE: Specific training pertinent to drilling/ Geoprobing ®/boring (CPDO training) will be provided and will be mandatory. Additionally, CPDO and trenching / excavation training are both required on projects where 3' or larger diameter boreholes are to be drilled.

6. *Are there any training requirements besides trenching/excavation training?*

Response: The committee evaluated a need for training specific to the HS 308 policy (drilling) and solicited the assistance of the training department and certain operations employees to develop CPDO training. This CPDO training includes basic steps needed to be taken from call the dig-safe number, private utility searches, geo-physical capabilities, probing, hand augering, air knifing, water pumping/knifing, hand digging and others.

7. *Hand diggings creates heat stress, tripping hazards, back injuries, and other hazards and is unnecessary.*

Response: The committee did not envision using a spade and a strong back to dig various 5' holes at the field site. The committee does envision using an air knife, water knife, probe, or other method rather than a hand shovel. The committee understands that not all methods may be acceptable in all states, municipalities or to all clients. The committee was also aware that when all else fails one could consider using a 1" diameter stainless steel auger placing 5' bgs hand borings in a triangular pattern where the auger bit could be placed in between these small hand borings. The committee envisions this theme and methodology to be expanded within the upcoming training. Additional information on augering techniques will be provided in the specific training (CPDO) mentioned above.

8. *I need to put borings in pristine farmland next door to a contamination zone. There are no and have never been any utilities in this area. What should I do?*

Response: Once you go through the proper utility locate procedure and are confident that no utilities

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exist in the subject area, you need to obtain a variance. This would also hold true for pristine forest preserves, wildlife refuges, or other areas not affected by utilities.

9. Who needs to sign off on a variance?

Response: Variances are signed by the Area Vice President (or designee, which may be delegated to the BLM for each office) along with the Project/Program Manager/Director. When we know in advance that HS308 cannot be adhered to, one should make plans to get a formal variance approval and appropriate paperwork developed two weeks prior to field activity. Variances can also be obtained when field conditions arise that make adherence to HS308 impossible. The variance can be obtained via cell phone in the field with the PM and appropriate management with the outcome noted in the field logbook followed up by an appropriate e-mail. This e-mail should be kept in the project file as proof of variance approval. It is recommended that variances be obtained as soon as it is known that they will be required.

10. What constitutes a "probe"? I assume a Geoprobe® is not valid?

Response: A Geoprobe® is NOT a valid probe in that Geoprobes® have caused damage to sewer lines and other utilities. Probes are typically made of a fiberglass-like material that have a pointed end but will not damage subsurface utilities and allows for the field staff to sense if underground items are encountered.

11. Under 5.1, is a subcontractor a designee?

Response: Although a subcontractor can make arrangements to contact dig safe and more, Shaw must ensure that the sub has, in fact, done what they had agreed to do. It should be remembered that typically on drilling projects, from many of our customer's perspective, the liability remains with Shaw, and they will look to Shaw, not our subs, for resolution of any events that occur. Hence, it is incumbent on Shaw to insure that our procedures are followed by Shaw and Shaw subs.

12. Does ground surface include concrete, asphalt or other man-made coverings?

Response: A simple NO. Some of our projects include drilling through airport runways or tarmacs which can be up to 15" in depth. Manmade surfaces do NOT count in the 5' hand dig clearance specification. If we are attempting to advance boreholes below existing concrete surfaces, the geology below the concrete will be exposed by cutting the concrete and removal of the concrete. After the concrete is removed and the geology is exposed, a hand auger can then be used. Hopefully, the twelve concerns above and the responses to these comments will have helped users understand the implementation of this HS 308 policy. More importantly the committee realizes that information on this subject will be provided during the training mentioned above. It is the committee's belief that once this program has been completely rolled out the need for variances will be minimal and the interactions of the safety department with operations management with this entire process will make ensure success.

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PROCEDURE

Subject: CONTROL OF HAZARDOUS ENERGY AND HAZARDOUS MATERIAL SOURCES (LOCKOUT/TAGOUT)

1.0 PURPOSE AND SUMMARY

This procedure establishes the minimum requirements for the lockout and tagout of energy and hazardous material sources and must be used to:

- Ensure that all machinery, equipment, or confined spaces are isolated from all potential hazard sources (mechanical, electric, chemical hazards, etc.) and are locked out and tagged out prior to employees performing any servicing, maintenance, or entry activities.
- Ensure that field projects where hazardous energy/material sources are present develop a site-specific Lockout/Tagout procedure.
- Ensure that equipment can accommodate locks. Additional means such as a tagout program may be used to ensure safety when locks are not used.
- Establish procedures for release of the Lockout/Tagout that include machine inspections, notification and safe positioning of workers, and removal of the Lock/Tag.
- Ensure the use of standardized locks and tags that identify the worker using them, making sure that locks and tags are of sufficient quality and durability to ensure their effectiveness.
- Provide the necessary employee training.

For a basic overview of the Lockout/Tagout System refer to the "Flow Diagram - Overview: Lockout/Tagout System" (Attachment 2).

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3.0 RESPONSIBILITY MATRIX

3.1 Procedures Responsibility

The Corporate Director 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

Affected Employee - An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout and tagout, or whose job requires the employee to work in an area in which isolation of hazards is necessary to provide a safe workplace.

Authorized Employee - A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance.

Blanking or Blinding - The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or skillet blind) that completely covers the bore, and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

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Capable of Being Locked Out - An energy/hazard isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy/hazard isolating device or permanently alter its energy control capability.

Double Valve and Vent - A valve arrangement in a piping system in which three valves are arranged in conjunction with a vent line. One valve is upstream of the vent, another downstream, and one is on the vent itself. To isolate the downstream system, the vent valve is opened, the other two are closed, and all three valves are locked in this position.

Energized - Connected to an energy source or containing residual or stored energy.

Energy Isolating Device - A mechanical device that physically prevents the transmission or release or energy, including but not limited to the following: A manually operated electrical circuit breaker, a disconnect switch, a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

Energy Source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Group Lock Box - A device capable of holding and securing the key or other release mechanism for a group lock, which can accomodate the individual locks from all members of the work crew.

Hot Tap - A procedure used in repair, maintenance, and service activities which involves welding on a piece of equipment (pipeline, vessel or tank) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Lockout - The placement of an energy/hazard isolating device, in accordance with an established procedure, which ensures that the equipment being controlled cannot be operated until the device is removed.

Lockout Device - A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy/hazard isolating device in the safe position and prevent the energization of a machine or equipment. This includes blank flanges and bolted slip blinds.

Normal Production Operations - The utilization of a machine or equipment to perform its intended production function.

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Qualified Employee - An employee whose skills and training meet or exceed 29 CFR 1910.332(b)(3) for work on or near exposed energized parts must, at a minimum, be trained in and familiar with the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment; to determine the nominal voltage of exposed lines; and the clearance distances to which the qualified persons will be exposed.

Servicing and/or Maintenance - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming machines or equipment, making adjustments or tool changes, where the employee may be exposed to an unexpected energization or start-up of the equipment, or release of hazardous energy/or material.

Setting-up - Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout - The placement of a tagout device on an energy/hazard isolation device, in accordance with an established procedure, to indicate that the device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout Device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolation device in accordance with an established procedure, that indicates that the device and the equipment being controlled may not be operated until the tagout device is removed.

5.0 TEXT

5.1 Scope/Application

This procedure covers any activity which requires isolation of a source of energy or hazardous material, such as, the servicing and maintenance of equipment and confined space entry. It outlines methods to prevent the unexpected energization or start-up of the equipment, or release of stored energy or material that could cause injury to employees. For any projects planned for more than 30 days with lockout/tagout planned for more than seven calendar days or when locking/tagging out specialized equipment having its own lockout requirements, a site-specific/equipment specific plan must be developed and incorporated as part of the Site-Specific Health and Safety Plan. Otherwise Attachments 4-7 (discussed later in text) must be utilized to document lockout/tagout.

In situations where our client has specific lockout/tagout requirements, Shaw Environmental & Infrastructure, Inc. (Shaw E & I) personnel can follow client procedures after an Shaw E & I health and safety professional has approved them as being at least as protective as Shaw E & I procedures. In such cases, the client procedures shall be incorporated into the Shaw E & I health and safety plan and all affected employees trained on these procedures.

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5.1.1 **Exclusions.** Normal operations including repetitive, routine minor adjustments that do not require removal of equipment guarding.

When work is conducted on equipment where an employee has direct control over the cord(s) or plug(s) connected to the associated equipment.

5.1.2 **References.** OSHA General Industry Standard, 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout), 29 CFR 1910.146, Permit-Required Confined Spaces, and 29 CFR1910.331-335, Safety-Related Work Practices.

5.2 Responsibility

Each new, transferred, authorized or affected employee and other employees whose work operations are or may be in an area where lockout/tagout procedures are utilized must be instructed in the purpose and use of this lockout/tagout procedure.

- **All Personnel**
  All site personnel will be responsible for continuous adherence to the health and safety procedures during the performance of assigned work. In no case may work be performed in a manner that conflicts with the intent of this procedure.

- **Authorized Employee**
  The authorized employee, or his/her designee, is responsible for reviewing the planned activities prior to commencement of work and confirming that the maintenance manager or his designee of the particular facility where the work is to be accomplished is made aware of the nature and extent of the work and when it is to commence.

- **Site Supervisor**
  The site supervisor is responsible for verifying that all proper lockout/tagout procedures have been followed. The site supervisor must ensure that the power disconnects, appropriate attachment of locks and tags, and proper documentation of the procedure are implemented. He/she is also the designated custodian and controller for all locks, tags, and group lock boxes issued to authorized employees.

- **Subcontractors, Visitors and Other On-Site Personnel**
  Subcontractors are responsible for the health and safety of their employees and for complying with the requirements established by the site Health & Safety Plan. All Shaw E & I subcontractors and visitors are responsible to the Shaw E & I site supervisor.

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- **Site Health and Safety Coordinator**
  The health and safety coordinator will assist in compliance with the other applicable company policies and procedures, and the Health and Safety Plan.

5.3 Procedures for Lockout/Tagout

Lockout and tagout devices must be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

Locks are to be used when a machine, equipment, or piping system is capable of being locked out. All locks must be accompanied by a tag to indicate the name of the employee applying the lockout device and warn against the hazard if the valve is opened, or the machine/equipment is energized. A legend such as "This lock and tag to be removed only by authorized personnel" with an additional message: "Do Not Start," "Do Not Open," "Do Not Close," "Do Not Energize," or "Do Not Operate" must be utilized.

All tags and their means of attachment must be sturdy enough to prevent inadvertent removal. The tag attachment will be attachable by hand, self-locking, non-releasable, and non-reusable, with a minimum unlocking strength of not less than 50 pounds. Tags must be durable and not deteriorate from exposure to weather conditions and corrosive environments or cause the message on the tag (hand written or pre-existing) to become illegible. Lockout and tagout devices must be singularly identified; must be the only device(s) used for controlling energy; and must not be used for other purposes.

All equipment must be designed with a hazardous energy/material isolating device as a means of protection for the employee against injury during repairs. **All new equipment installed must be designed to accept a lockout device.**

Authorized padlocks will be assigned to each authorized employee. Each group's lock will be individually keyed and the supervisor on each shift will maintain possession of the master key for these padlocks. The specific project must provide a sufficient number of locks for each employee on site.

All tags must contain the authorized employee name, date of application of the lock, equipment name or number and the reason for lockout. The tag must be attached to the lockout device.

On any equipment that can start automatically, the main disconnect must be switched to the "off" position, locked, and tagged by the authorized employee. This switch must be turned off before opening the main power disconnect and remain off until the disconnect is closed. Locking out 220v, 440v and other equipment must always be done at the main feed or starter panel.

All hazardous material lines must be blanked, blinded, or double valve and vent locked to prevent release of hazardous material.

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Blanking or blinding of hazardous material lines are preferable to the double valve and vent technique. All blanks and blinds must be identified with tags in the same manner as locks.

A "Lockout Log" (Attachment 3) must be maintained by the site supervisor. This log must be included in the Health and Safety Plan.

5.3.1 Lockout/Tagout Overview

- Check equipment file for specific lockout/tagout procedures.
- Determine the requirements for lockout. If there is more than one energy source to the equipment, document each source.
- Conduct a survey to locate and identify all energy isolation devices that apply to the equipment.
- Use the equipment type-specific procedures as outlined in Attachments 4-7, if applicable. Complete the "Lockout/Tagout Procedure for Specific Equipment" form (Attachment 8) logging all data and return to the site-supervisor.
- Shut off energy source(s) to affected equipment.
- Affix lock(s) and tag(s) to each energy source controlling device.
- Identify work on process lines or vessels and determine isolation requirements.
- Blind, blank, disconnect, or double valve and vent all hazardous material lines, including steam, and identify the isolation points with tags.
- When only tag is used because machine or equipment can't be locked out, the following steps must be taken: Remove fuses, block machine, etc. and complete the "Lockout/Tagout Procedure for Specific Equipment" form (Attachment 8) and give to the site supervisor for the record.
- Stored energy - Relieve all stored energy from capacitor banks, springs, compressed air, hydraulic, steam, etc.
- Verify isolation of energy has occurred by attempting to activate equipment by using the on/off switch.
- Return control switch to "off" position before proceeding with work.

5.3.2 Removal of Lockout/Tagout

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- Ensure that nonessential items, such as tools, etc., are removed from equipment.
- Ensure that equipment components are intact.
- Check work area to ensure that all employees are safely positioned or removed from the area.
- Notify all affected employees and site supervisor before re-energizing the equipment.
- Remove lockout/tagout device.
- Re-energize equipment or open valves and restore flow in process line, place back in into service.

5.3.3 Preparation for Confined Space Entry

1. Refer to Shaw E & I Procedures HS300, HS301, or HS302 for Confined Space Entry.
2. Blank or blind piping, identify with tags.
3. Misalign or remove sections of lines, pipes, or ducts, identify with tags.
4. Double valve and vent system, identify with tags.
5. Lockout or tagout all sources of energy.
6. Block or disconnect all mechanical linkages.

If it is impossible or impractical to lockout a piece of equipment, the site supervisor, H&S Professional, and the Maintenance Engineer of the facility must approve a method to make the equipment safe before any activities beyond normal operations of the equipment are performed. This can be done by disconnecting wiring, removing fuses, disconnecting or blanking supply lines, etc. "Danger - Do Not Operate" tags must be used to describe the condition.

The practice of permitting a person to place or remove a lock for someone else is prohibited. No employee can be sure he/she is safe until he/she places their own lock correctly.

5.4 Safety Audit

5.4.1 Verification Audit. A periodic audit of the lockout/tagout system must be performed to ensure that the requirements of this procedure are being implemented. The audit will be conducted by authorized and qualified employees other than the ones(s) utilizing the procedurebeing inspected. Any deficiencies that are observed must be corrected immediately. For each project, the site-supervisor will be responsible for daily audits of lockout/tagout systems to

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ensure proper installation of locks and tags to the equipment and adherence to the appropriate procedures.

Where lockout or tagout is used for energy control, the periodic inspection must include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

5.4.2 **Follow-up Audit.** A follow-up audit must be conducted to ensure that all deficiencies noted have been corrected.

5.4.3 **Documentation.** Audit documentation must identify the machine or equipment on which the lockout procedure is being utilized, the date of the inspection, employees interviewed and employee(s) performing the inspection. The audit results must be provided to the Health & Safety Department to be documented as being performed.

5.5 Training

Training must be provided to ensure that the purpose and function of the energy control program are understood by employees, and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees.

- Each authorized employee must receive training in the recognition of applicable hazardous energy/material sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for isolation and control.
- All affected employees must be instructed in the purpose and use of the lock and tag system.
- All other employees (including new hires) whose work operations are or may be in an area where lockout/tagout may be utilized, must be instructed about the procedure, and the prohibition relating to attempts to restart or re-energize machines or equipment that are locked out or tagged out.
- Retraining must be conducted for all authorized and affected employees whenever there is a change in job assignment, change in equipment, changes in a process that presents a new hazard or there is a change in the lockout/tagout procedure. Retraining must also be conducted whenever there is significant evidence, based on the periodic audits, indicating employee deviation from, or lack of understanding of, the lockout/tagout procedure.

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- Employee site-specific training must be documented to ensure that it has been accomplished and is being kept up to date. The documentation must contain each employee's name and dates of training.

Documentation of employee training and retraining must be maintained and kept up to date by the Shaw E & I H&S representative and forwarded to the Shaw E & I Training Department.

5.6 Shift or Personnel Changes

Specific procedures must be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection. These must include provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment or the release of stored energy. All site-specific locks in place must be covered in the tailgate safety meetings on each shift.

All individual lock(s) of the outgoing shift working on equipment will be removed and replaced by the on-coming shift's individual lock(s). The authorized employees of the on-coming shift must inspect and "try" the system to ensure de-energization.

The site supervisor must re-audit the system as necessary.

5.7 Troubleshooting

Special precautions must be observed when the authorized employee must perform maintenance troubleshooting tasks with energized equipment. This function requires added caution and communications between all other affected employees to ensure employee protection.

An authorized employee must identify all start-stop locations and circuit breakers for disconnecting equipment. All other affected employees must be kept informed throughout the testing and troubleshooting. If the job is left incomplete, the authorized employee must install his/her individual lock and tag before leaving the job.

The following sequence must be followed when troubleshooting any equipment:

1. Written approval including detailed work plan, must be obtained from the site supervisor and H&S Professional to ensure that troubleshooting can be performed safely.
2. Inspect and clear machine or equipment of all tools and unnecessary materials.
3. Ensure that all affected employees are positioned out of the way of machine activation. Instruct all affected employees in the procedures that must be followed, the potential hazards that may exist, and the safety precautions that have been taken. Document this training on the Tailgate Safety meeting form.
4. Remove the lockout and tagout devices.

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5. Energize and proceed with the troubleshooting, testing or positioning of the machine or equipment.

6. De-energize, reapply all lockout and tagout devices and "try" the system to ensure de-energization or place machine back into service.

5.8 Group Lockout/Tagout

When servicing and/or maintenance is performed by a crew, craft, department or other group, the work crew must use a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

- Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device.
- Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment; and
- When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee to coordinate affected work forces and ensure continuity of protection; and
- Each authorized employee must affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and must remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

The following procedure applies to distribution and utilities systems. The employee authorized to "Group Lockout" will lock and tag out the system. Using the "group lockout" locks and tags. The "Group Lockout" must be signed by the authorized employee.

1. Use of personal tags and locks on the "Group Lock Box" must follow the normal lockout/tagout procedure.

2. The authorized employee must verify that all energy sources are in a neutral state.

3. The authorized employee places the group lock and tags on the hazard isolation device.

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4. The authorized employee then places the "Group Lock Key" in the "Group Lock Box", and tag the box with a "DANGER DO NOT OPERATE" tag stating which system is locked out and why.

5. Each employee, prior to working on the "Group Lockout" system, must attach his/her personal tag and lock to the "Group Lockout Box."

6. Upon completion of work, all employees must remove their personal lock and tag.

7. The authorized employee must them remove the "Group Lock" locks and tags and follow normal procedures for restoring energy.

8. If repairs take more than the initiating shift, and the authorized employee is not remaining on the job for the completion, he/she may transfer "Authorization" to another employee by stating so on the "DANGER DO NOT OPERATE" tag. The employee identified then becomes the authorized employee. He/she is now authorized to remove the "Group Lockout" locks and tags installed by the original authorized employee if the work is completed on that shift. The follow-up shift must them follow normal procedures for "Group Lock/Tagout."

5.9 Outside Personnel (Contractors, etc.)

Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer must inform each other of their respective lockout or tagout procedures.

All subcontractors lockout/tagout procedures must be reviewed and approved by Shaw E & I prior to the project.

5.10 Special Situations

If lockout/tagout lasts for more than one shift, the appropriate protection must not be interrupted. No lock is to be removed until the next shift is ready to lockout the equipment.

When the employee(s) who originally applied a lock(s) is not at the site to remove it, the lock can be removed only in an emergency and only under the direction of an authorized employee, the site-supervisor, and if applicable the site-safety and health coordinator. Such actions and associated personnel safeguards shall be documented on the Field Activity Daily Log and the Lockout Log.

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6.0 EXCEPTION PROVISIONS

Variances to this procedure shall be requested in accordance with procedure HS013 Health and Safety Procedure Variances.

7.0 CROSS REFERENCE

HS050 Training Requirements
HS052 Health and Safety Plans
HS300 Confined Spaces
HS301 Confined Spaces, Marine
HS302 Confined Spaces, Leaded Product
HS310 Hazardous Waste Operations
HS311 Emergency Response Operations
HS312 Hazardous Waste Operations at TSD Facilities

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Flow Diagram - Overview: Lockout/Tagout System
3. Lockout Log
4. Lockout/Tagout for Electrical Equipment
5. Lockout/Tagout for Compressed Air and Gases
6. Lockout/Tagout for Steam, Water, and Fluid Lines
7. Lockout/Tagout for Hydraulic Equipment
8. Lockout/Tagout Procedure for Specific Equipment

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ATTACHMENT 1
CONTROL OF HAZARDOUS ENERGY SOURCE (LOCKOUT/TAGOUT)

Responsibility Matrix

Action	Procedure Section	*Responsible Party*						
		Location Mgr.	Authorized Associate	Site Supervisor	Sub-contractor	HS	All	Training Dept.
Comply with procedure	5.2				X		X	
Review plan & notify maintenance	5.2		X					
Verify proper procedures followed	5.2	X		X		X		
Verification audit - daily	5.4.1			X				
Provide training to associates	5.5	X						
Attend appropriate training	5.5						X	
Maintain training records	5.5							X
Write/approve location lockout plan, if required	5.1		X			X		

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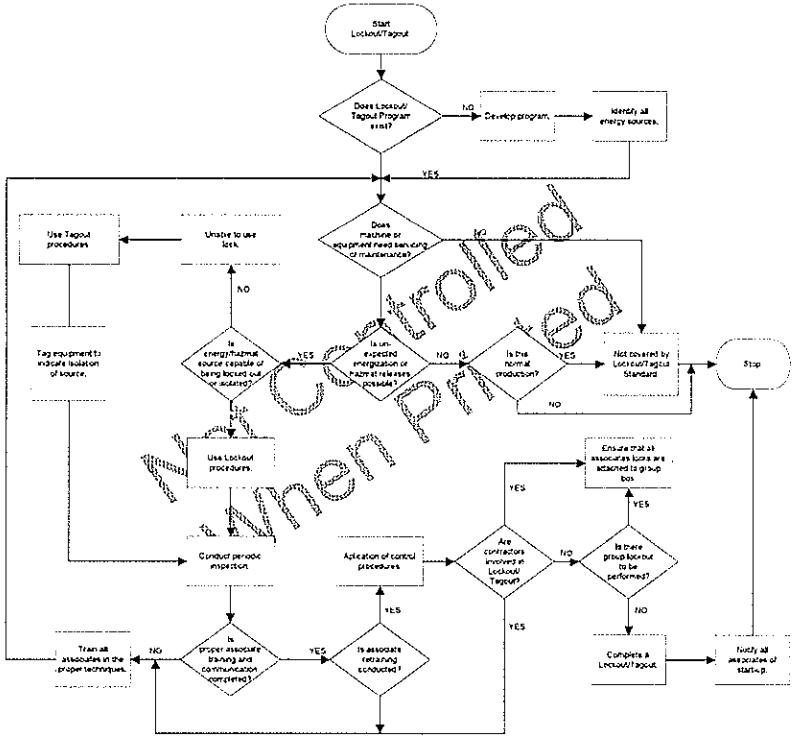
ATTACHMENT 2

FLO DIAGRAM:
OVERVIEW of the LOCKOUT/TAGOUT SYSTEM



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ATTACHMENT 3

LOCKOUT LOG

AUTHORIZED EMPLOYEE	DATE	EQUIPMENT NAME	EQUIPMENT NUMBER	REASON FOR LOCKOUT

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ATTACHMENT 4
LOCKOUT/TAGOUT FOR ELECTRICAL EQUIPMENT

Job:_____

Device:_____

Location:_____

Authorized Person:_____

Site Supervisor:

PREPARATION FOR SHUTDOWN

1. Determine power type and shutoff location
2. Determine if there is more than one energy source
3. Determine magnitude of power (voltage)
4. Notify affected employees in the area that equipment will be under lockout for maintenance.
5. Shutoff power sources to machine.

LOCKOUT/TAGOUT

6. Lock and tag main power switches in the OFF position, remove fuses.
7. Verify that no power is available to the equipment using a voltmeter, if necessary.
8. Drain devices such as capacitor banks.
9. Verify that these devices have no stored energy by use of the voltmeter.
10. Repair equipment.

RETURN TO SERVICE

11. Be sure all connections are made and any unused tools and equipment are removed.
12. Remove lock if necessary to verify machine is repaired. The maintenance employee, while verifying the machine is repaired cannot leave the immediate area.
13. Remove tag from machine.
14. Notify employees in the area that the equipment is available.

Signature:

Authorized Person:_____

Site Supervisor: _____

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ATTACHMENT 5
LOCKOUT/TAGOUT FOR COMPRESSED AIR AND GASES

Job:_____

Device:_____

Location:_____

Authorized Person:_____

Site Supervisor:

PREPARATION FOR SHUTDOWN

1. Determine types and shutoff location
2. Determine if there is more than one energy source
3. Determine magnitude of compressed air, gas, steam, water or fluids.
4. Notify affected employees in the area that equipment will be locked out for maintenance.
5. Shutoff main supply to machine.

LOCKOUT/TAGOUT

6. Lock and tag main supply in the OFF position.
7. Bleed line and verify that no air or gases remain in the equipment.
8. Repair equipment.

RETURN TO SERVICE

9. Be sure all connections are made and any unused tools and equipment are removed.
10. Remove lock if necessary to verify proper operation.
12. Remove tag.
13. Notify employees in the area that the equipment is available.

Signature:

Authorized Person:_____

Site Supervisor: _____

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ATTACHMENT 6
LOCKOUT/TAGOUT FOR STEAM, WATER, AND FLUID LINES

Job:_____

Device:_____

Location:_____

Authorized Person:_____

Site Supervisor:_____

PREPARATION FOR SHUTDOWN

1. Determine types and shutoff location
2. Determine if there is more than one energy source
3. Determine magnitude of compressed air or gas.
4. Notify affected employees in the area that equipment will be under lockout for maintenance.
5. Disconnect/shutoff main steam, water or fluid lines to equipment.

LOCKOUT/TAGOUT

6. Lock and tag main supply (i.e. chaining through valve handle with lock) in the OFF position with a bleeder open on the load side.
7. Drain fluids from shutoff valves to equipment.
8. Repair equipment.

RETURN TO SERVICE

9. Be sure all connections are made and any unused tools and equipment are removed.
10. Remove lock if necessary to verify machine is repaired. The maintenance employee cannot leave the immediate area, while verifying the machine is repaired.
11. Remove tag from machine.
12. Notify employees in the area that the equipment is available.

Signature:

Authorized Person:_____

Site Supervisor: _____

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ATTACHMENT 7
LOCKOUT/TAGOUT FOR HYDRAULIC EQUIPMENT

Job:_____

Device:_____

Location:_____

Authorized Person:_____

Site Supervisor: _____

PREPARATION FOR SHUTDOWN

1. Determine types and shutoff location
2. Determine if there is more than one energy source
3. Determine magnitude of energy (pressure).
4. Notify affected employees in the area that equipment will be under lockout for maintenance.
5. Shutoff main hydraulic to equipment.

LOCKOUT/TAGOUT

6. Lock and tag main supply in the OFF position.
7. Drain fluids from shutoff valves to equipment.
8. Verify that the hydraulic fluid is disconnected.
9. Block ram or items controlled by the hydraulic system using the appropriate blocking.
10. Repair equipment.

RETURN TO SERVICE

11. Be sure all connections are made and any unused tools and equipment are removed.
12. Remove lock if necessary to verify machine is repaired. Maintenance employee cannot leave the immediate area, while verifying the machine is repaired.
13. Remove tag from machine.
14. Notify employees in the area that the equipment is available.

Signature:

Authorized Person:_____

Site Supervisor:_____

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ATTACHMENT 8
LOCKOUT/TAGOUT PROCEDURE FOR SPECIFIC EQUIPMENT

Equipment:

Cat. No. and Location:

Serial Number (if available):

Electrical: Voltage: Location:

Describe:

Air (Type): Location:

Describe:

Gases (Type): Location:

Describe:

Steam (Type): Location:

Describe:

Water: Location:

Describe:

Fluids: Location:

Describe:

Hydraulic: Location:

Describe:

Stored Energy- Capacitors, Springs, Etc.:

Describe:

LOG DATA AND RETURN TO SITE-SUPERVISOR

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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.

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  - 5.1.1 Heat Rash
  - 5.1.2 Heat Cramps
  - 5.1.3 Heat Exhaustion
  - 5.1.4 Heat Stroke
- 5.2 Prevention
- 5.3 Monitoring
  - 5.3.1 Wet Bulb Globe Temperature
  - 5.3.2 Physiological
- 5.4 Training

6.0 Exception Provisions
7.0 Cross References
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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

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.

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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.

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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:

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- 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

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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

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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.

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4.1.1 Frostbite
4.1.2 Hypothermia
4.2 Precautionary Measures
4.3 Training
5.0 Exception Provisions
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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

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.

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- 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.

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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

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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			
Receive training	4.2	X		

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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.

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  5.5 Control Measures

    5.5.1 Sound Control at the Source
    5.5.2 Sound Control in the Transmission Path
    5.5.3 Protection for the Receiver
  5.6 Recordkeeping
6.0 Exception Provisions
7.0 Cross References
8.0 Attachments

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.

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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.

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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:

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- 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.

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- 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

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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			

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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.

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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		

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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		

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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.	

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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. Head, eye, body, and foot protection are discussed in this procedure. The language covering respiratory and hearing protection is cross referenced to the appropriate company procedures.

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- 5.4 Respiratory Protection
- 5.5 Hearing Protection
- 5.6 Body Protection
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- 5.8 Management Duties

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of H&S 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, rubber boots, protective clothing covering (e.g. Tyvek), 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 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 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.

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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 and must include rigid side shields
- "Over the Glasses" safety glasses shall be provided to employees that require the use of prescription eyewear. Should an employee purchase their own Z87.1 prescription eyewear, the "Over the Glasses" style protective eyewear will not be required.
- No contact lenses are to be worn in work areas unless required for medical reasons and approved by the site safety officer.
- 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 all employees with protective eyewear meeting the ANSI Z87.1 standard. Should an employee

require prescription eyewear, he/she shall have two options: 1) the employee shall purchase and use approved Z87.1 prescription lenses, or; 2) the employee may purchase and use prescription eyewear that is not rated as ANSI Z87.1 and the company shall provide the employee with protective "Over the Glasses" safety glasses (meeting ANSI Standard Z87.1). In all cases, lenses shall be clear polycarbonate or plastic, the manufacturer of the glasses must be clearly marked on the frames and the Z87.1 lettering must also be clearly visible. Special tints or dark lenses can be used for special applications (e.g., extended outdoor work) with prior written approval from the local Health & Safety representative.

There are some cases whereby employees, requiring corrective lenses, are assigned to projects requiring the use of full face respirators. Many times, the employee's corrective lenses are sized such that they fit within the respirator. In those cases where the employees' glasses do not fit, the company shall purchase lenses and frames sized for respirators and the respirator insert.

Employees should contact their supervisor and the local H&S representative (with current lens prescription), who will coordinate with the local purchasing representative to order eyewear that will fit within the respirator.

5.2 Foot Protection

Employees are responsible for their own basic footwear and foot protection. Basic foot protection is required for all job sites and industrial locations. Specialized footwear shall be provided by the company 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 area. Generally, when the employee desires to use safety footwear other than the company provided standard chemical resistant footwear (e.g. rubber boots), the company considers it the responsibility of the employee to provide such protective footwear and ensure that it meets ANSI Standard Z41 (including a defined heel, puncture resistant sole and protective toe cap). Company supervision will enforce the use of appropriate protective footwear per the requirements of the site-specific Health and Safety Plan.

Under the limited circumstances where the company will provide safety shoes, such purchases must be approved by the project or appropriate department/local manager. In those limited cases whereby the project approves such purchases, the local or project EHS representative should be consulted to assist and verify 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 following the verification that they meet applicable ANSI requirements.

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Athletic-style safety shoes ("safety sneakers") are <u>prohibited</u> 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 local H&S Manager.

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 and to ensure that any employee provided protective equipment is adequate, properly maintained and in a sanitary condition.

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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

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ATTACHMENT 1
PERSONAL PROTECTIVE EQUIPMENT

Responsibility Matrix

Action	Procedure Section	*Responsible Party*			
		Director of H&S	Local HS Departmen t	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

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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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- 5.9 Program Evaluation

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7.0 Cross References
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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.

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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.

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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.

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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 Contractor Personnel:

- Disposable equipment such as filter elements.
- Hardware for airline systems (up to, but not including, the airline and facepiece) which employees are sharing.

The company will not provide the following respiratory protective equipment to Contractor Personnel:

- APR or PAPR facepieces.
- SCBAs, SAR respirators, or airline.

The company may provide respiratory protective equipment to Labor Pool Personnel 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.

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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

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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.

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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.

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- 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 all 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.

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- 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.

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- 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

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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.

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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

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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 repairperson.

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.

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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

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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 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.

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- 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 (≤ 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

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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:

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- 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

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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

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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		

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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
			MSA	Comfo II	479529 S 479428 M 479530 L
	Full-Face	Negative Pressure	Survivair	20/20	202062 S 202072 M 202082 L
			MSA	Ultra Twin	480263 S 480259 M 480267 L
Powered APR	Hood	Continuous Positive Pressure	Survivair	PAPR	5200-15
			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
			MSA	Premaire	497291
SCBA SAR	Full-Face	Positive Pressure Demand	Survivair	Cougar	P 9643310
			MSA	MMR WorkMask 2216	Varies on Components
Emergency	Escape/Egress Unit	Continuous Flow	Survivair	5 min. EEGA	9750870
			MSA	Custom Air V	484353

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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.

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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.

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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.

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    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.

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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.

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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

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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

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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

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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 ONBT 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.

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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.	

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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.

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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.

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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.

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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.

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- 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

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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.

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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	☒	☒	☒

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NOTES:

1. When using air compressors, intake location shall be carefully selected and monitored closely to ensure air supplied to the compressors 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). This certification will be evaluated via the established point system to determine driving privilege status.
- All new hire candidates shall complete and be familiar with the company Rules for Motor Vehicle Operation (Attachment 2). 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 as soon as possible, but not longer than 24 hours after the occurrence. Once reported, the established evaluation criteria in Section 5.4 will be used to determine corrective actions.
- Employees have the responsibility to keep track of their non-work related vehicular citations and utilize the established evaluation criteria found in Section 5.3 to determine if their overall MVR citations exceed the Overall Driving Record limits (See Section 5.3.2).
- Employees utilizing vehicles while on company business are required to review this procedure and attend a company-designated driver training class at least once every two years.
- Requests for the re-instatement of denied or revoked driving privileges can be made to the appropriate business line Vice-President and the Director of Health & Safety.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director 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 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 $2,500.00.

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Company - Shaw Environmental & Infrastructure, Inc. (Shaw E & I) and its subsidiaries and affiliates.

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 ATV's (Four Wheelers) earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles. The use of motorcycles on company business is prohibited

Project Assigned Employees – Any employee that is assigned to a field operations project position. This designation includes Project Managers, Site Managers/Supervisors, Foremen, Technicians, Scientists, Geologists, Project Business Accountants, etc. This does not include employees that are typically assigned to an office but are visiting a site for brief periods of time, such as to provide technical assistance, perform audits, perform program reviews, etc.

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 & Employee Driving Record Certification (Attachment 2) prior to such operation. The signed form shall be retained by the Baton Rouge, LA Health & Safety Records Department. Each year, the company shall reserve the right to require covered employees to sign a copy of the most current Company Rules for Motor Vehicle Operation.

FAILURE OF EMPLOYEES TO COMPY WITH COMPANY RULES FOR MOTOR VEHICLE OPERATION OR THIS POLICY SHALL BE SUBJECT TO DISCIPLINARY ACTION UP TO AND INCLUDING (BUT NOT LIMITED TO) REVOCATION OF DRIVING PRIVILEGES FOR COMPANY BUSINESS AND TERMINATION OF EMPLOYMENT.

Those employees who are assigned to use an Employer vehicle which they take home with them must meet the following conditions:

a) The Employee's supervisor signs an Authorization for Assignment Form (See Attachment 7)
b) The Employee signs and agrees to be bound to a Vehicle Usage Agreement (See Attachment 8)
c) The Employee provides proof of insurance on the Employee's personal vehicle which lists the Employee as an insured driver on the insurance and such insurance contains minimum coverage required by law and acknowledges that the Employee's personal insurance will provide primary coverage of the Employee's use of a Company owned vehicle when such use is not in the course and scope of employment. The

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authorizing supervisor shall attach a copy of the proof or personal insurance to Attachment 8 for future reference.

The Vehicle Usage Agreement is an agreement by the Employee that his own personal vehicle insurance will be primary as to any claims arising from the Employee's **NON COMPANY** use of Company Vehicles.

Employees operating Company Vehicles without compliance with these requirements, as well as any supervisor who allowed or granted such use, will be deemed to be in violation of Company policy and will be subject to discipline up to and including termination from employment.

5.1.1 Project Assigned Employee Vehicle Use Requirements

The following requirements are set forth as it pertains to Project Assigned Employees.

- Project-assigned employees are not permitted to operate company vehicle (owned, leased or rented) on non-company business after 10:00 p.m. without written authorization from the project manager or the appointed Site Manager/Supervisor with jurisdiction over the vehicle. In those cases where there is shift work, a non-traditional workday (i.e. 3PM to 11PM workday, etc.) or other non-typical circumstances, it is understood that the after 10:00 PM restriction would not be appropriate. However, even in these non-typical circumstances, the Project Manager or the appointed site manager/supervisor shall be required to execute the required written authorization for use of a company vehicle, including the time frame in which employees shall be permitted to use the vehicle after their non-traditional workday.

- Project assigned personnel that are residing in temporary housing / hotels are granted permission to drive to and from the temporary residence and work. Additionally, the Project Manager, or the appointed Site Manager/Supervisor his/her designee (Site Manager, Supervisor, etc.) is required to evaluate and optimize the potential of carpooling of project assigned personnel in an effort to reduce the number of company vehicles being driven to and from the project site.

- Project assigned employees shall not use company vehicles for sight seeing or any other personal/recreational activities.

- Vehicles may be used in support of "daily life activities" such as going to restaurants for dinner, laundromats, local retail stores, grocery stores, etc.

- A maximum distance for "daily life activity" driving shall be no further than 20-miles from the temporary housing in which an employee resides. In those cases where the maximum allowed distance does not permit daily

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life activities to be conducted, a written authorization, from the Project Manager or the appointed Site Manager/Supervisor, is required to travel further distances.

- For normal routine travel to and from work, employees shall utilize their own personal transportation.
- If an employee is assigned to a project site that is located within driving distance from the employee's permanent residence, but is too far away to allow for a daily commute, that employee shall utilize their own personal transportation to drive to and from their permanent residence and the project site. (i.e. for initial assignment arrival to the project, trips home on rotation, etc.) Upon arrival to the site, employees shall be allowed to use a company vehicle as required to perform project activities. In these cases, the employee will also be required to drive their personal vehicle to and from the project site from their temporary housing / hotel residence, for personal "daily life activities", etc.
- Employees may drive a Shaw-owned, leased or rented vehicle home during off hours only when authorized in writing by a business line manager, who must hold a position at least one level above the site / project manager to whom the authorized employee reports. In other words, the approval must be signed by the employee's, supervisor's, supervisor or a higher level manager.
- In making vehicle use decisions the authorizing manager shall consider the risk of vehicle accidents, Shaw's liability risks, client and project specific needs, distances to be traveled, employee driving history, and any other relevant factors. Attachments 7 and 8, (Authorization for Assignment and Vehicle Use Agreement forms), shall be used to facilitate this process.

5.2 Pre-employment Evaluation

Human Resources shall distribute a copy of this procedure to all new hire candidates for the completion of Attachment 2 & 3. Information provided should be evaluated via the point system in Section 5.3. Human Resources and the hiring manager will be 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 Baton Rouge, LA Corporate Health and Safety Records Department at (225) 987-3714. The driving status of the prospective employee will be reported to the appropriate Human Resources Department. Health & Safety will notify the appropriate Human Resources manager when the attachments are not returned.

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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 Driving Record Point System

The following point system will be used to evaluate the driving record of all existing employees and new hire candidates that can reasonably be expected to operate a motor vehicle during their employment. This data is to be collected through Motor Vehicle Records (MVR) search and by the employee completing Attachment 2 of this policy. Attachment 2 is to be completed by the new hire candidate and reviewed by the regional H&S Assistant to ensure compliance.

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, etc.	2
At-fault accident, seatbelt violation	3
Major citation: reckless driving, tailgating, suspended license, speed contest, improper lane usage, Open Container (Non-Work Related), etc.	6
Driving under the influence, Hit and Run (leaving the scene)	8
Open Alcohol Container (Work Related)	8

5.3.1 Pre-Employment Driving Record Point System Evaluation

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 a new hire has accumulated 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 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 appropriate business line Vice President and the Director of Safety and Health for reconsideration of driving privileges.

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If a new hire candidate is expected to drive a vehicle, to fulfill the responsibilities of his/her role, and there has been an 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, the candidate shall not be hired. See Table below:

Candidate's Driving Privilege Status Description	Past 12 Months	Past 24 Months
Can drive without restriction.	0 to 3 points	0 to 5 points
Can drive with understanding of probationary status.	4 to 6 points	6 to 8 points
Not eligible for company driving privileges for first 12 months of employment.	7 to 11 points	9 to 15 points
Candidate not eligible for hire.	12 points or more	16 points or more

5.3.2 Existing Employee Driving Record Point System

An acceptable traffic record is one requirement for continued driving privileges. Accordingly, all affected employee's MVR traffic record is subject to periodic and annual review to ensure compliance with state and federal regulations, as well as company policy.

WORK RELATED TRAFFIC VIOLATIONS

It is the responsibility of all affected employees to provide verbal notice to their supervisor of any work related traffic violations that have occurred as soon as practicable but not longer than 24 hours after the occurrence. This verbal notice shall be followed by the employee completing an updated "Company Rules for Motor Vehicle Operation & Employee Driving Record Certification" (Attachment 2), and "Notification of Work Related Citation" form (Attachment 3). Both Attachment 2 and 3 shall then be immediately forwarded to the Baton Rouge, LA Health and Safety Records office.

NON-WORK RELATED TRAFFIC VIOLATIONS

Employees have the responsibility to keep track of their non-work related vehicular citations and utilize the established evaluation criteria, as described below, to determine if their overall traffic citations exceed acceptable company limits. It is not necessary for employees to report non-work related citations to their supervisor as they occur. However, if an employee's overall MVR record (work related or not) exceeds the company's established points system criteria, the employee must verbally inform their supervisor as soon as practicable but not longer than the following business day after the occurrence. This verbal notice shall be followed by the employee completing an updated Attachment 2 (Company Rules for Motor Vehicle Operation & Employee Driving Record Certification), and it shall then be immediately forwarded to the Baton Rouge, LA Health and Safety Records office.

OVERALL DRIVING RECORD EVALUATION

If it is determined that an employee 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)

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months, they will be allowed to continue with the privilege to drive motor vehicles on company business without restrictions.

If an employee has accumulated 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, the employee will be placed on probation for a period of twelve (12) months. The employee can continue to drive motor vehicles on company business during this probationary period.

If the employee 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. Continued employment may only be extended with the strict understanding of denial of the privilege to drive company owned, leased or rented motor vehicles on company business. After the first twelve (12) months following driving privilege revocation, the employee can petition their respective Business Line VP and the Director of Safety and Health for reconsideration of driving privileges. See Table below:

Employee's Driving Privilege Status Description	Past 12 Months	Past 24 Months
Can drive without restriction.	0 to 3 points	0 to 5 points
Can drive with understanding of probationary status.	4 to 6 points	6 to 8 points
Company driving privileges are revoked.	7 to 11 points	9 to 15 points

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 all infractions including those incurred while on company business and during off-work hours. It is imperative that employees notify their supervisors immediately as possible and no later than 24 hours following a work-related citation/accident. Once notified, the supervisor will ensure the completion of Attachment 2, forward it to the Baton Rouge, LA H&S Records Office, and initiate one of the following corrective actions as required. Additionally, as it relates to non-work related and work related traffic violations, it is the employee's responsibility to ensure that their overall driving record does not allow for the exceeding of the driving records points system. Should the employee's driving record points exceed the system limits, that they must notify their supervisor immediately, complete an updated "Company Rules for Motor Vehicle Operation & Employee Driving Record Certification" (Attachment 2 & 3) and forward it to the Baton Rouge, LA Health & Safety Records Department.

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5.4.1 Work-Related Minor Citation

When an employee is given a work related minor citation (i.e., speeding ticket, moving violation, failure to signal turn, loss of load, etc.), the employee's supervisor will meet with the 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 and the cost of this training will be borne by the employee. This course shall be pre-approved by the Division Health & Safety Manager. The supervisor will provide written direction to the employee regarding the assigned corrective action(s). The supervisor shall forward a copy of an updated Company Rules for Motor Vehicle Operation & Employee Driving Record Certification form (Attachment 2 & 3) and a form of verification showing the employee's successful completion of an approved defensive driving course to the appropriate regional Human Resources Department for inclusion in the employee's personnel file. These documents shall also be forwarded to the **Baton Rouge, LA Health & Safety Records Department.**

5.4.2 Work Related Major Citation

When an employee is given a work related major citation (i.e., reckless driving, tailgating, suspended license, 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, as described in section 5.4.1, 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 any work or non-work related citation or accident within the required reporting time, his/her company driving privilege may be revoked. The supervisor will also take disciplinary action that is appropriate for the unreported event. If the unreported event is work related and is either an at-fault accident, driving under the influence case or a hit and run violation, 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.

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5.4.4 At-Fault Accident

Whenever an employee is operating a company owned/leased/rented vehicle or their personal vehicle on company business and 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, as described in section 5.4.1. 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, Hit & Run (Leaving The Scene) and Open Container

If an employee is charged with Driving Under the Influence, Hit and Run or an Open Alcohol Container violation, he/she will have their driving privileges temporarily suspended pending final resolution of the charge. If the charge is resolved in the employee's favor with a final adjudication holding no penalty, driving privileges may be re-instated. However, if any penalty is attached, such as probation, license restrictions, etc., the employee may be considered unqualified to drive for the company. Whenever an employee is convicted or pleads no contest to a company-related driving under the influence, hit and run or open container charge, he/she will be immediately terminated.

In a case that is not work related, and an employee is convicted or pleads no contest to a hit and run or driving under the influence charge, the employee shall notify his supervisor. Accordingly, the employee's company driving privileges will then be revoked for twelve (12) months. After the first twelve (12) months following driving privilege revocation, the employee can petition their respective Business Line VP and the Director of Safety and Health for reconsideration of driving privileges.

5.5 Training

All employees who will, or may reasonably be expected to, drive a company owned/leased/rented vehicle or their personal vehicle on company business shall review this procedure and complete the currently-designated company driver training class prior to such operation. This class is designed to be taught either via the company's Web-based training program or by local Health and Safety personnel and must include the following elements: federal/state/local driving rules, company driving rules, emergency/accident procedures, and defensive driving techniques. Specific information

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on the vehicle to be operated will be provided locally. Personnel conducting this class shall provide the Knoxville Health and Safety Training Department with a copy of the course attendance sheet for inclusion in individual training records. All affected employees shall complete a driver safety training class at least once every two years.

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 Vice President and the Director of Health and Safety for reinstatement. The Director of H&S, or his designee, shall specify rehabilitation program (if applicable), an external safe driving course, and any other requirements in which he/she deems appropriate. Once the employee completes the program, documentation of successful completion must be formally presented to the appropriate Vice President and the Director of H&S. If the documentation is accepted, the driving privilege may be reinstated. Copies of all documents shall then be forwarded, by the responsible H&S Manager, to Human Resources and to the Baton Rouge, LA Health & Safety Records Department.

Reinstatement of the driving privilege may occur one (1) time, at the discretion of the Director of Health & Safety and the responsible Business Line Vice President. If employee driving performance leads to a subsequent revocation of this privilege, such revocation shall be permanent.

5.7 Non-Shaw Employee Vehicle Use Requirements

Only approved non-Shaw employees (client, subcontractor or temporary/temp agency employees) who have completed and signed the "Non-Shaw Employee Driver Questionnaire" (HS800 Attachment 5) will be allowed to drive a Shaw owned, leased, or rented vehicle. Upon completing the questionaire and prior to the driver operating a Shaw vehicle, the subject questionnaire must be signed , dated and placed on file at the job site. The primary vehicle operator or the Shaw Project Management representative shall review the questionnaire and determine whether the non-Shaw employee satisfies the driver qualification requirements of HS800. The driver qualification point system can be found in section 5.3 of this policy.

In addition to the above requirement, it is also a requirement of the responsible Shaw Project Manager to forward a fully executed, company specific version of the correspondence that is found in Attachment 6, to the employer of the non-Shaw driver. This correspondence should not be modified except for the fields that specify the name and address of the subcontractor or client to which the letter is being written. This written correspondence will serve to notify that any employee that is assigned by their company to a Shaw project, and is required to operate/drive a Shaw owned, leased, or rented vehicle, will be subject to either meeting or exceeding the operator requirements for Shaw employees.

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As the employer of individuals who are assigned to a Shaw project, the authorized non-Shaw employer representative shall sign and return Attachment 6 to the respective Shaw Project Manager. By signing Attachment 6, the non-Shaw employer is acknowledging that they are either adopting the requirements set forth in this policy (HS800, Motor Vehicle Operation) or have developed a similar policy that meets or exceeds these requirements. Failure of a non-Shaw employer to comply with the requirements set forth in HS800 shall result in the prohibition of their employees driving any Shaw owned, leased or rented vehicles.

5.8 DRIVER SAFETY NOTIFICATION STICKER

A safety notification bumper sticker shall be applied to all Shaw owned / leased vehicles in an effort to ensure continued compliance with driving safety regulations. The notification service will be managed by a third party fleet safety management company and will serve as the recipient of all calls that are placed concerning unsafe driving behavior. The Findlay, OH equipment division will serve as the first point of contact as it pertains to notifications that are received from the third party company who administers the bumper sticker safety call-in service. Upon receiving a report from the third party administrator, the equipment division shall determine what business line the vehicle / driver is located within and then contact the respective business line Divisional H&S Manager. The Divisional H&S Manager will then contact the affected employee and the employee's supervisor for a counseling/discussion meeting, concerning the complaint. Upon conclusion of the meeting, the information will be reviewed by the supervisor and the Divisional H&S Manager for determination of corrective or disciplinary action.

The company shall endeavor to ensure that all company owned/leased fleet vehicles shall have a safety notification bumper sticker applied to the rear of the vehicle. It is the responsibility of the driver, who is deemed the primary / responsible operator of the vehicle, to ensure that the sticker remains on the vehicle and remains legible and in no way defaced. If the vehicle is project or program assigned and there is no designated primary operator, then the Project Manager will be considered the primary / responsible operator. The primary / responsible operator shall contact the Equipment Division in Findlay, OH, at 1-800-225-6464 ext. 6051 or direct dial 419-425-6051, immediately upon recognizing that the sticker is defaced or removed such that a new one can be re-applied. Failure, on the part of the primary operator, to ensure that a legible sticker remains on the vehicle shall result in disciplinary action, up to and including vehicle usage being revoked, in addition to possible termination of employment.

6.0 EXCEPTION PROVISIONS

Variances and exceptions, not explained herein, may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

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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. Driving Record Certification
4. Notification of Work-Related Citation
5. Non-Shaw Employee Driver Questionnaire
6. Memo Template for Employers of Non-Shaw Drivers
7. Vehicle Use Authorization Form

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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 Human Resources	Director of H&S
Issue, Revise, and Maintain This Procedure	3.1						X
Ensure Employees Complete Attachment 2	5.1			X		X	
Distribute HS800 to New Hire Candidates for Completion of Attachment 2	5.2					X	
Request Evaluation of New Hire Driving Record	5.2	X		X		X	
Obtain Driving Record and Determine Driving Status	5.2	X					
Initiate Corrective Actions	5.4			X		X	
Ensure Completion and Distribution of Attachment 3	5.4						
Accident Review	5.4.4				X		
Ensure Drivers Meet Training Requirements	5.5		X	X			
Specify Program for Reinstatement of Driving Privilege	5.6						X
Reinstatement of Driving Privilege	5.6						X
Non-Shaw Employee Vehicle Use Requirements	5.7			X			
Contact Employee to discuss report from Safety Notification Sticker Service	5.8		X	X			

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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, walk around inspection prior to use (including load evaluation, if applicable). No vehicle with any mechanical defect, which endangers the safety of the driver, passengers, or the public, shall be used. The motor vehicle operator is also responsible for the Driver Safety Notification sticker (Sec. 5.8)

3. All company owned/leased trucks, should have small convex mirrors attached to the side mirrors.

4. The operator shall drive defensively at all times and 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 at all times 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. (See also: unauthorized personal use of company vehicles) (Sec. 5.7)

8. The operator shall not allow for any open alcoholic beverage containers within a company vehicle or within a personal vehicle while it is being utilized for company business.

9. No employee shall drive beyond any barricades or into any area with designations such as HAZARDOUS, DO NOT ENTER, etc.

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 or in personal vehicles while being used for company business.

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.

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    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 as soon as possible, but not longer than 24 hours after occurrence, for work related citations, accidents, and license expiration, suspension, or revocation.

20. 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 has 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.

21. Project-assigned employees are not permitted to operate company owned, leased, or rented vehicles after 10:00 p.m. without written authorization from their supervisor. (See section 5.1.1)

22. Employees shall not operate company vehicles for any type of personal use, no exceptions. Personal use includes any usage that is not directly related to company business. See section 5.1.1 for definitions concerning "daily life activities" for Project Assigned Employees.

23. Employees shall not use a company vehicle to visit an establishment that has a primary function of providing nighttime entertainment including the dispensing of alcoholic beverages.

24. Temporary or non-Shaw employees shall be allowed to utilize Shaw company vehicles only after the driver has completed Attachment 5 and has satisfied the point system requirements set forth in Section 5.3 of this policy. In addition, the employer of that driver shall have satisfied the requirement set forth in section 5.7 of this policy and signed a copy of the memo set forth in Attachment 6. This includes clients or subcontractors.

25. Employees shall not transport family members, friends or any other unauthorized guest passenger unless it is arising out of course and scope of company business.

26. Employees may not drive company owned, leased, or rented vehicles home when off of duty <u>except when authorized in writing</u> by a designated business line manager and in accordance with Sec. 5.1.1.

27. Employees needing to use a mobile phone or engage in other potentially distracting activity while operating a Motor Vehicle are advised to pull off the road when safe to do so for the duration of the activity.

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 Signature	Date

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ATTACHMENT 3
DRIVING RECORD CERTIFICATION

Fair Credit Reporting Act Disclosure Statement

In accordance with the provisions of Section 604 (b)(2)(A) of the Fair Credit Reporting Act, Pubic Law 91-508, as amended by the Consumer Credit Reporting Act of 1996 (title II, Subtitle D, Chapter I, of Pubic Law 104-208), you are being informed that reports verifying your driving record may be obtained on you for employment purposes. These reports are required by Sections 382.413, 391.23 and 391.25 of Federal Motor Carrier Safety Regulations. You have the right to receive a copy of the reports and have the prescribed allotment of time by law to have any errors corrected and the reports obtained after corrections have been posted.

	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, seatbelt violation	3
Major citation: reckless driving, tailgating, suspended license, speed contest, improper lane usage, open container (non-work related)	6
Driving under the influence or Hit and Run (Leaving the Scene)	8
Open Alcohol Container (Work Related)	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 or may result in revocation of my company driving privileges.

Driver's License No. _____ Driver's Lic. State of Issuance _____

Expiration Date _____ Date of Birth _____

Print Name _____ Social Security Number

Signature _____ Date

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PLEASE FAX THIS FORM TO THE BATON ROUGE H & S RECORDS DEPARTMENT AT (225) 987-3714

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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 ☐ Yes Details _____

_____

_____

Employee Signature _____ Date _____

Corrective Action Being Taken _____

_____

_____

Supervisor Signature _____ Date _____

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ATTACHMENT 5
Non-Shaw Employee Driver Questionnaire

_____ *Date* _____ *Time*

_____ *Vehicle is assigned to what Shaw Employee?* _____ *Signature of Shaw Employee*

_____ *Non-Shaw Driver's Name*

Do you have a valid driver's license? Yes No

State in which license was issued, DL Number and Exp Date _____

Have you had any citations or accidents in the past 24 months? Yes No

If yes, please list type of citations and the associated dates below:

_____

_____

_____

(Refer to HS800, Section 5.8. to determine driver eligibility based on the points system provided)

By signing below, I, the temporary driver, am acknowledging that the above information is true and accurately represents my driving record. I understand and agree that any misrepresentation or omission of material fact on this questionnaire will constitute sufficient grounds for your removal from the project site and will restrict the future use of Shaw vehicles.

I have read and fully understand the above:

_____ *Signature of Non-Shaw Driver*

_____ *Date*

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ATTACHMENT 6

Address
Address
Phone
Fax:

Memorandum

Date:

To:

CC:

From: Project Manager

RE: Requirements for Motor Vehicle Operation

Attached is Shaw Environmental & Infrastructure, Inc. (Shaw) policy HS800 - Motor Vehicle Operation: General Requirements. As you can see, this policy applies to all operators of Shaw owned, leased, or rented vehicles, as well as personal vehicles used on Shaw business.

Accordingly, you are hereby notified that any employee that is assigned by your company to a Shaw Environmental & Infrastructure, Inc project and is required to operate/drive Shaw owned, leased, or rented vehicles, will be subject to either meeting or exceeding the operator requirements for Shaw employees. Please be aware that as the employer of individuals who are assigned to a Shaw project, you must ensure that your company either adopts the requirements set forth in policy HS800 (Motor Vehicle Operation) or develop a similar policy that meets or exceeds those requirements.

Only approved non-Shaw employees, who have completed and signed the "Non-Shaw Employee Driver Questionnaire" (HS800 Attachment 5) will be allowed to drive a Shaw vehicle. Furthermore, prior to the driver operating a Shaw vehicle, the subject questionnaire must be completed and placed on file at the job site. The primary vehicle operator or responsible Shaw management representative shall review the questionnaire and determine whether the non-Shaw employee satisfies the driver qualification requirements of HS800.

Failure to comply with the requirements of this correspondence or the requirements set forth in HS800 shall result in disciplinary action up to and including driving privilege revocation or removal of an affected non-Shaw employee from a project site. If the duties of your employees are expected to include driving a Shaw owned, leased or rented vehicle, please complete Attachment 5, for all of your affected personnel, and provide these to Shaw's site management. Alternatively, please be aware and make your employees aware that they are not authorized to drive a Shaw owned, leased, or rented vehicle without such compliance.

By signing this document, I, an authorized employee and agent of the subject company/employer, am acknowledging acceptance of the above information and agree to my employer's compliance with the referenced requirements stated herein.

_____
Signature Title

_____
Date

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ATTACHMENT 7
AUTHORIZATION FOR ASSIGNMENT FORM

I, the hereby undersigned Supervisor / Manager, give my consent and approval for the Employee listed below to be assigned a Company Owned and/or Rented vehicle ("Company Vehicle") as specified herein and in accordance with the Company Motor Vehicle Use Policy and the Company Rules for Motor Vehicle Operation. I have given a copy of the Rules and the Policy to the Employee listed below and the Employee has signed and agreed to be bound by the Vehicle Usage Agreement.

Employee Name_____
VIN Number of Vehicle_____
Company Vehicle ID Number_____
Period of Allowance_____
Phone:_____
Company by which employed:_____

I, the undersigned Supervisor, personally attest that the following things have been done and are in proper order: *(Please check off when complete and attach appropriate documents)*

- ☐ Employee Driving Record Complete within the last six months
- ☐ Employee Driving Record rating allows operation of motor vehicle in accordance with policy *(List Rating _____ Date Completed_____)*
- ☐ Employee has presented a valid driver's license *(attach a copy)*
- ☐ Employee has signed the Vehicle Use Agreement and a copy has been obtained by the Company *(attach a copy)*
- ☐ Employee has been given a copy of Motor Vehicle Use Policy and Company Rules for Motor Vehicle Operation
- ☐ Employee has provided sufficient Proof of Insurance as required by the Policy *(attach a copy)*

SUPERVISOR SIGNATURE: _____
Printed Name:_____
Date:_____
Phone Number:_____

FAX A COPY OF THIS FORM TO THE EQUIPMENT DIVISION IN FINDLAY, OHIO @ 419-425-6295. ALSO NOTE THAT THE AUTHORIZED EMPLOYEE AND THE AUTHORIZING MANAGER IS RESPONSIBLE FOR MAINTAINING COPIES OF THIS FORM FOR FUTURE REFERENCE AND AUDITING.

DO NOT FAX THIS FORM TO THE BATON ROUGE H & S RECORDS DEPARTMENT

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ATTACHMENT 8
VEHICLE USE AGREEMENT

THIS VEHICLE USE AGREEMENT made and entered into this _____day of _____, _____, between the undersigned Employee listed below ("Employee") and the undersigned Company below ("Company")

WITNESSETH:

WHEREAS, Employee has been granted permission to be assigned a Company owned/leased vehicle ("Company Vehicle") as is set forth and approved on the AUTHORIZATION FOR ASSIGNMENT FORM

In consideration of being assigned use of a Company Vehicle, Employee agrees to the following:

1. Employee will not use the Company Vehicle for personal use. .
2. Employee will follow all rules and requirements set forth in the Company's Motor Vehicle Use Policy, a copy of which Employee has received;
3. Employee certifies that Employee has automobile insurance on a personal vehicle of Employee, Employee has provided to Company a copy of such insurance, and a copy is attached to this agreement;
4. Employee agrees that for any claims for damage, injury or death related to Employee's operation of the Company Vehicle while operating the vehicle on non-company business (personal use), that Employee's own personal automobile liability insurance will be primary and will pay the claim **FIRST AND BEFORE** any insurance of Company. In the event that Employee fails to secure and maintain personal automobile insurance coverage and there is a claim for damage or injury related to Employee's operation of the vehicle for personal use, the Employee will then be responsible and accepts liability for any claims paid by Company up to the minimum limits of insurance required in the state of the Employee's permanent residence.
5. Employee understands that violation of this Agreement or any policy or provision or rule contained in the Motor Vehicle Use Policy or any other Policy of the Company will subject the Employee to discipline including the potential loss of driving privileges for the Company or suspension or termination.

I am a person who is able to read in English and I have read this document and agree to all of its terms and conditions. I understand that the privilege to be assigned a Company Vehicle to take home can be withdrawn by the Company at any time for any reason (and without cause) with notice to me. I agree to comply with return of the vehicle when requested by the Company.

Employee_____
Date:_____
Address:_____
Phone:_____

COMPANY Supervisor / Manager:
Name (Print & Sign):_____Date:_____

FAX A COPY OF THIS FORM TO THE EQUIPMENT DIVISION IN FINDLAY, OHIO @ 419-425-6295. ALSO NOTE THAT THE AUTHORIZED EMPLOYEE AND THE AUTHORIZING MANAGER IS RESPONSIBLE FOR MAINTAINING COPIES OF THIS FORM FOR FUTURE REFERENCE AND AUDITING.

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APPENDIX C
ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization	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	Warning vests, hard hat, safety glasses and 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 MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization (continued)	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 • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up/disconnect 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 Shaw procedure HS315, 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 MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization (continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Avoid razor knives. Use hooked cutters or shears whenever possible • Cut away from the body • 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 • Review Shaw Health and Safety Procedure HS302-Ladders		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Hearing protection	
	Burns associated with loading/unloading equipment 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 buns		
	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 Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with Shaw Health and Safety Procedure HS400		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
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 Site Specific Health and Safety Plan. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION FACILITIES SET-UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Set-up	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions • Halt exterior work in high winds, severe weather	Body harnesses/ lanyard (elevated platforms above 6 ft.)	
	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 Lockout-Tagout procedures in accordance with Health and Safety Procedure HS315	Lockout/Tagout Devices	Voltage Meter or “Tic” Tracer
	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	Warning vests, hard hat, safety glasses and steel toe work boots	

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION FACILITIES SET-UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Set-up (continued)	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		
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects off of skin • Use protective insect repellents containing 25% DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek® coveralls, duct tape bottom of coveralls to boots or latex boot covers when there is a potential for insect/animal bite	
	Contact Dermatitis/ Poison Ivy	• Wear long sleeve shirts / trousers to avoid skin contact with plants or other skin irritants • Identify and review poisonous plants with workers • Avoid unnecessary clearing of plant/vegetation areas • Cover vegetation with plastic where survey position raises exposure potential • Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions • Identify workers who are allergic to poison ivy and determine any specialized first aid requirements	Tyvek® coveralls, duct tape bottom of coveralls to boots or latex boot covers when there is a potential for contact dermatitis/poison ivy	

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION FACILITIES SET-UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Set-up (continued)	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	
	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 to exceed 85 db A TWA	Hearing protection	
	High 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
• 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 Site Specific Health and Safety Plan. • Review operations/safety manuals for all equipment utilized

ACTIVITY HAZARD ANALYSIS FOR SITE CLEARING AND GRADING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing and Grading	Struck By/ Against Heavy Equipment	• Isolate equipment operation areas • Make eye contact with operators before approaching equipment • Understand and review hand signals	Reflective vest, hard hat, safety glasses and steel toe work boots	
	Slips, Trips, Falls	• Clean mud and grease from your boots before mounting equipment. Watch for slippery/unstable ground when dismounting equipment • Exit equipment slowly and maintain three point contact • Clear walkways, work areas of equipment, tools, vegetation, and debris		
	Handling Heavy Objects	• Observe proper lifting techniques • Use Dozer or Track hoe to move logs and brush		
	Eye Injuries	• Wear face shield, goggles when operating powered clearing / grubbing equipment	Face shield, goggle or face screen	
	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	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Hearing protection	

ACTIVITY HAZARD ANALYSIS FOR SITE CLEARING AND GRADING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing and Grading (continued)	High/Low Ambient Temperature	• Monitor for Heat / Cold stress in accordance with Shaw Health and Safety Procedures HS400, HS401 • Provide fluids to prevent worker dehydration • Take adequate rest periods in a cool/warm shaded area • During rest breaks, replenish body fluids by drinking plenty of fluids (water and Gatorade type liquids). Do not drink caffinated beverages • Remove PPE if possible during rest periods • Include plenty of salt in your food intake. Do not take salt tablets	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
	Unstable ground; rollover of equipment.	• Identify path of travel before moving dozer or track hoe 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)		
	Adverse weather conditions: -lightening -high winds -driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		

ACTIVITY HAZARD ANALYSIS FOR SITE CLEARING AND GRADING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Bulldozer		• 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 operations/safety manuals for all equipment utilized • Review site contaminants • Review the SSHSP.	

ACTIVITY HAZARD ANALYSIS FOR CONCRETE PAD DEMOLITION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Demolition	Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Complete the underground utility permit in accordance with Shaw Health and Safety Procedure HS308 • 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		
	Struck by	• Establish exclusion zone around pad before demolition begins • Restrict personnel access to the area • Ensure personnel in the area are protected with safety glasses and face shield		
	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 • Observe work area and location of other personnel before lifting/moving objects with sharp edges	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR CONCRETE PAD DEMOLITION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
	Inhalation of Nuisance Particulates/Contact with concrete materials	• Provide workers proper skin and eye protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Monitor breathing zone air to determine levels of contaminants/silica • Apply water to concrete to reduce dust as possible • Restrict personnel from the downwind area of the demolition area		Data Ram
	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 • Understand and review hand signals • Step away from equipment when bucket adjustments are made. • 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) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Hearing protection	
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions • Exit equipment slowly and maintain three point contact • Clean boot soles before climbing on equipment		

ACTIVITY HAZARD ANALYSIS FOR CONCRETE PAD DEMOLITION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
	Handling Heavy Objects	• Observe proper lifting techniques • Review proper lifting posture/techniques regularly at safety meetings • Obey sensible lifting limits (60 lb. Max per person) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting	Warning vests, hard hat, safety glasses and steel toe work boots	
	High/Low Ambient Temperature	• Monitor for Heat / Cold stress in accordance with Shaw Health and Safety Procedures HS400, HS401 • Provide fluids to prevent worker dehydration • Take adequate rest periods in a cool/warm shaded area • During rest breaks, replenish body fluids by drinking plenty of fluids (water and Gatorade type liquids). Do not drink caffinated beverages • Remove PPE if possible during rest periods • Include plenty of salt in your food intake, however, do not take salt tablets	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
	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 Superintendents and workers • Remind workers not to respond/participate in horseplay started by others		

ACTIVITY HAZARD ANALYSIS FOR CONCRETE PAD DEMOLITION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Excavator/Hoeram • Grappler • Air monitoring equipment • Miscellaneous hand and power tools • Generator		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Underground Utility Permit (HS308) • Excavation permit (HS307)	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan • Review the hazards associated with site contaminants	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF EROSION CONTROLS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of Erosion Controls	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools and debris • Mark, identify, or barricade other obstructions		
	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		
	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 repellant, wear PPE to protect against sting/bite injuries	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers, as necessary	
	Contact with Poison Ivy/ Dermatitis	• Wear PPE to avoid skin contact with contaminated soil, waste, plants, or other skin irritants • Identify and review poisonous plants with workers • Identify workers who are known to contract poison ivy. • Use Ivy Block® protective lotion, as necessary • Wear PPE and tape joints to keep poison ivy irritants plant matter away from skin	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot cover, as necessary. Leather gloves	
	Struck-by Hand Tools, Flying Debris	• Hold stakes in place with tongs, vice-pliers or other remote grasping tools • Wear safety goggles when using sledge hammer, hatchet, maul or axe	Leather gloves, full-face shield and goggles	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF EROSION CONTROLS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of Erosion Controls (continued)	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	
	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 85dBA TWA	Hearing protection	
	High Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with Health and Safety Procedure HS400		Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Silt fence • Shovels • Hammers		• 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 the SSHSP • Review the all applicable Shaw Health and Safety Procedures.	

ACTIVITY HAZARD ANALYSIS INSTALLATION OF ASPHALT CAP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of asphalt cap	Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Complete the underground utility permit in accordance with Shaw Health and Safety Procedure HS308 • 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		
	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 • Observe work area and location of other personnel before lifting/moving objects with sharp edges	Leather gloves	
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Establish path for truck delivering materials • Make eye contact with operators before approaching • Understand and review hand signals • Step away from equipment when bucket adjustments are made. • Park equipment in areas where operator can see clearly to dismount equipment • Stay clear of dump trucks when raising beds • Dump loads on stable surfaces only to prevent tipping.		

ACTIVITY HAZARD ANALYSIS INSTALLATION OF ASPHALT CAP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of asphalt cap (continued)	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 85dBA TWA	Hearing protection	
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions • Exit equipment slowly and maintain three point contact • Clean boot soles before climbing on equipment		
	Handling Heavy Objects	• Observe proper lifting techniques • Raking/shoveling of asphalt material is heavy. Use care when performing this task. • Review proper lifting posture/techniques regularly at safety meetings • Obey sensible lifting limits (60 lb. Max per person) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting	Warning vests, hard hat, safety glasses and steel toe work boots	
	High Ambient Temperature	• Monitor for Heat stress in accordance with Shaw Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration • Take adequate rest periods in a cool/warm shaded area • During rest breaks, replenish body fluids by drinking plenty of fluids (water and Gatorade type liquids). Do not drink caffeinated beverages • Remove PPE if possible during rest periods • Include plenty of salt in your food intake, however, do not take salt tablets		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS INSTALLATION OF ASPHALT CAP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of asphalt cap (continued)	Contact with hot materials	• Personnel shall wear clothing and equipment to prevent direct contact with the hot asphalt material • The work practices for installing the asphalt should limit employees walking through/contacting the material		Multi-gas meter; Data Ram

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Asphalt installation equipment • Bulldozer • Dump trucks	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Underground Utility Permit (HS308) • Excavation permit (HS307) • Inspect all dump trucks in accordance with Section 18 of the USACE EM 385-1-1 Manual	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan • Review the hazards associated with hot asphalt

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF SUBGRADE STORM WATER DRAINAGE PIPING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Trenching	Contact with Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Be aware that the radial grounding system composed of copper wires maybe buried 6 to 12 inches below ground surface. • Complete the underground utility permit in accordance with Shaw Health and Safety Procedure HS308 • 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		
	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 • Observe work area and location of other personnel before lifting/moving objects with sharp edges	Leather gloves	
	Struck By/ Against Heavy Equipment	• Stay clear of trenching bar • Ensure guards are in place on rotating equipment • Make eye contact with operators before approaching • Understand and review hand signals • Prohibit nonessential personnel from the immediate area	Warning vests, hard hat, safety glasses and steel-toed boots	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF SUBGRADE STORM WATER DRAINAGE PIPING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Trenching (continued)	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 85dBA TWA	Hearing protection	
	Slips, Trips, Falls	• Clear, walkways and proposed work areas of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions • Clean boot soles as often as required		
	Handling Heavy Objects	• Observe proper lifting techniques • Review proper lifting posture/techniques regularly at safety meetings • Obey sensible lifting limits (60 lb. Max per person) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting		
	Inhalation and Contact with Site Contaminants	• Provide workers proper skin and eye protection based on the exposure hazards present. • Monitor breathing zone air to determine levels of contaminants. • Dampen work area to control dust. • Position workers upwind as much as possible.	Level D	pDR
Pipe fusing	Chemical exposure	• Review MSDS sheets for glues and solvents • Provide workers proper skin and eye protection based on the exposure hazards present. • Wear protective gloves as specified in the MSDS	Hard hat, safety glasses, steel toe work boots	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF SUBGRADE STORM WATER DRAINAGE PIPING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Pipe fusing (continued)	Flash fire	• Review MSDS sheets for glues and solvents to determine if they are flammable • Prohibit smoking in the area and while using the solvent/glues • Store the materials in a fire safe area • Concentrate on the work task being performed		
	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion • Use the buddy system for installation of the pipe		
	Struck by	• Be alert to the loose ends of piping material rebounding and striking some • Wear hard hat and safety glasses	Hardhat and safety glasses	
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions		
Backfilling	Struck By/ Against Heavy Equipment	• Wear reflective warning • Isolate equipment swing areas • Make eye contact with operators before approaching • Understand and review hand signals • Park equipment in level area where operator can dismount and maintain equipment easily	Warning vests, hard hat safety glasses and 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)	Hearing protection	
	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 • Observe work area and location of other personnel before lifting/moving objects with sharp edges	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF SUBGRADE STORM WATER DRAINAGE PIPING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Backfilling (continued)	High/Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with Shaw Health and Safety Procedures HS400 and HS401		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Excavator/Trencher • Backhoe	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Underground Utility Permit (HS308) • Inspect all dump trucks in accordance with Section 18 of the USACE EM 385-1-1 Manual	• Review AHA with all task personnel. • Review the Site-specific Health and Safety Plan • Review the hazards associated with site contaminants and cement materials • Review applicable Shaw Safety Procedures.

ACTIVITY HAZARD ANALYSIS FOR PARKING LOT LIGHT INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Parking lot light installation	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	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions		
	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		
	Eye Injuries	• Wear face shield, goggles when operating powered clearing / grubbing equipment	Goggles and face shield	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Hearing Protection	
	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion		
	Horseplay	• Prohibit horseplay at all project sites • Review rules about horseplay with subcontractor • supervisors and workers • Remind workers not to respond/participate in horseplay • started by others		

ACTIVITY HAZARD ANALYSIS FOR PARKING LOT LIGHT INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Parking lot light installation (continued)	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 Shaw procedure HS315, Control of Hazardous Energy and the Site Specific Lockout/Tagout/Try Plan	Lockout-Tagout Devices	Voltage Meter or “Tic” Tracer

ACTIVITY HAZARD ANALYSIS FOR PARKING LOT LIGHT INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Parking lot light installation (continued)	Falls from Operation of Boom lift	• Review operation manual and safety devices of boom lift with all operators. • Inspect equipment before use • Full body harness and lanyard is required while operating boom lift • Review path of travel for any debris, tools, holes, etc. before moving boom lift • Use spotters when moving boom lift. • Spotters must wear reflective vests • Do not step out of the basket or stand on the railing • Isolate equipment swing areas • Wear leather gloves while attaching members to protect against pinch injuries. • Falling out of the aerial lift may tip the aerial lift. The lanyard must be adjusted to prevent falling out of the lift should there be a sudden movement or failure. • Never tie off to an adjacent structure. • Always maintain a firm footing in the lift. • Do not stand under loads that are being raised or lowered with the lift. • Maintain appropriate distance from overhead utilities. >50 kV, add .04 inches per kV to obtain the safe distance. If voltage is unknown, remain at least 20 feet from the power lines. • Tools should always be hung or put into belt when possible • Plan for an emergency rescue in the event the lift becomes stuck.	Full body harness, reflective vests, hard hat, safety glasses, steel toed boots	

ACTIVITY HAZARD ANALYSIS FOR PARKING LOT LIGHT INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Parking lot light installation (continued)	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with Shaw Health and Safety Procedures # HS400, HS401 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Boom truck • Electrical equipment • 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 the Site-specific Health and Safety Plan • Review operations/safety manuals for all equipment. • Review the all applicable Shaw Health and Safety Procedures.

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION OF BIORETENTION PONDS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Construction of Ponds	Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Be aware that the radial grounding system composed of copper wires maybe buried 6 to 12 inches below ground surface. • Complete the underground utility permit in accordance with Shaw Health and Safety Procedure HS308 • 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		
	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 • Observe work area and location of other personnel before lifting/moving objects with sharp edges	Leather gloves	
	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 • Understand and review hand signals • Step away from equipment when bucket adjustments are made. • Park equipment in areas where operator can see clearly to dismount equipment	Warning vests, hard hat, safety glasses and steel-toed boots	

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION OF BIORETENTION PONDS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Construction of Ponds (continued)	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 85dBA TWA	Hearing protection	
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions • Exit equipment slowly and maintain three point contact • Clean boot soles before climbing on equipment		
	Handling Heavy Objects	• Observe proper lifting techniques • Review proper lifting posture/techniques regularly at safety meetings • Obey sensible lifting limits (60 lb. Max per person) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting		
	Inhalation and Contact with Site Contaminants	• Provide workers proper skin and eye protection based on the exposure hazards present. • Monitor breathing zone air to determine levels of contaminants. • Dampen work area to control dust. • Position workers upwind as much as possible. • Monitor for carbon monoxide when operating heavy equipment (combustion engines) in enclosed areas.	Level D	pDR and PID (as necessary)

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION OF BIORETENTION PONDS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Construction of Ponds (continued)	Excavation Wall Collapse	• Construct diversion ditches or dikes to prevent surface water from entering excavation • Provide good drainage of area adjacent to excavation • Collect ground water/rain water from excavation and dispose of properly • Store excavated material at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face • Place ladders no more than 25 feet apart laterally • Treat excavations over 4 feet deep as confined spaces • Complete confined space permit entry procedure • Monitor atmosphere for flammable/toxic vapors, and oxygen deficiency • Slope, bench, shore, or sheet excavations over 5 feet deep if worker entry is required • Assign a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting • Inspect excavations daily and any time conditions change • Provide at least two means of exit for personnel working in excavations	Hard hat, safety glasses, steel toe work boots	
Manual Excavation	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		
	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion		
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions		

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION OF BIORETENTION PONDS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Construction of Ponds (continued)	Struck By/ Against Heavy Equipment	• Wear reflective warning • Isolate equipment swing areas • Make eye contact with operators before approaching • Understand and review hand signals • Park equipment in areas where operator can see clearly to dismount equipment	Warning vests, hard hat safety glasses and 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)	Hearing protection	
	High/Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with Shaw Health and Safety Procedures HS400 and HS401		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Excavator • Air monitoring equipment • Dump Trucks or Loaders	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Underground Utility Permit (HS308) • Excavation permit (HS307) • Inspect all dump trucks in accordance with Section 18 of the USACE EM 385-1-1 Manual	• Review AHA with all task personnel. • Review the Site-specific Health and Safety Plan. • Review the hazards associated with site contaminants. • Review applicable Shaw Safety Procedures.

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 • Isolate 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) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb per person for manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with Shaw Health and Safety Procedures # HS400, HS401 • Provide fluids to prevent worker dehydration	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT TO BE USED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Heavy Equipment • Hand tools • Seed/fertilizer		• Equipment inspections • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review SSHP • Review site-specific AHA with all task personnel	

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, & 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® coverall, inner latex sample gloves, outer nitrile gloves, latex boot covers, goggles/ face shield.	

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination (continued)	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	
	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		

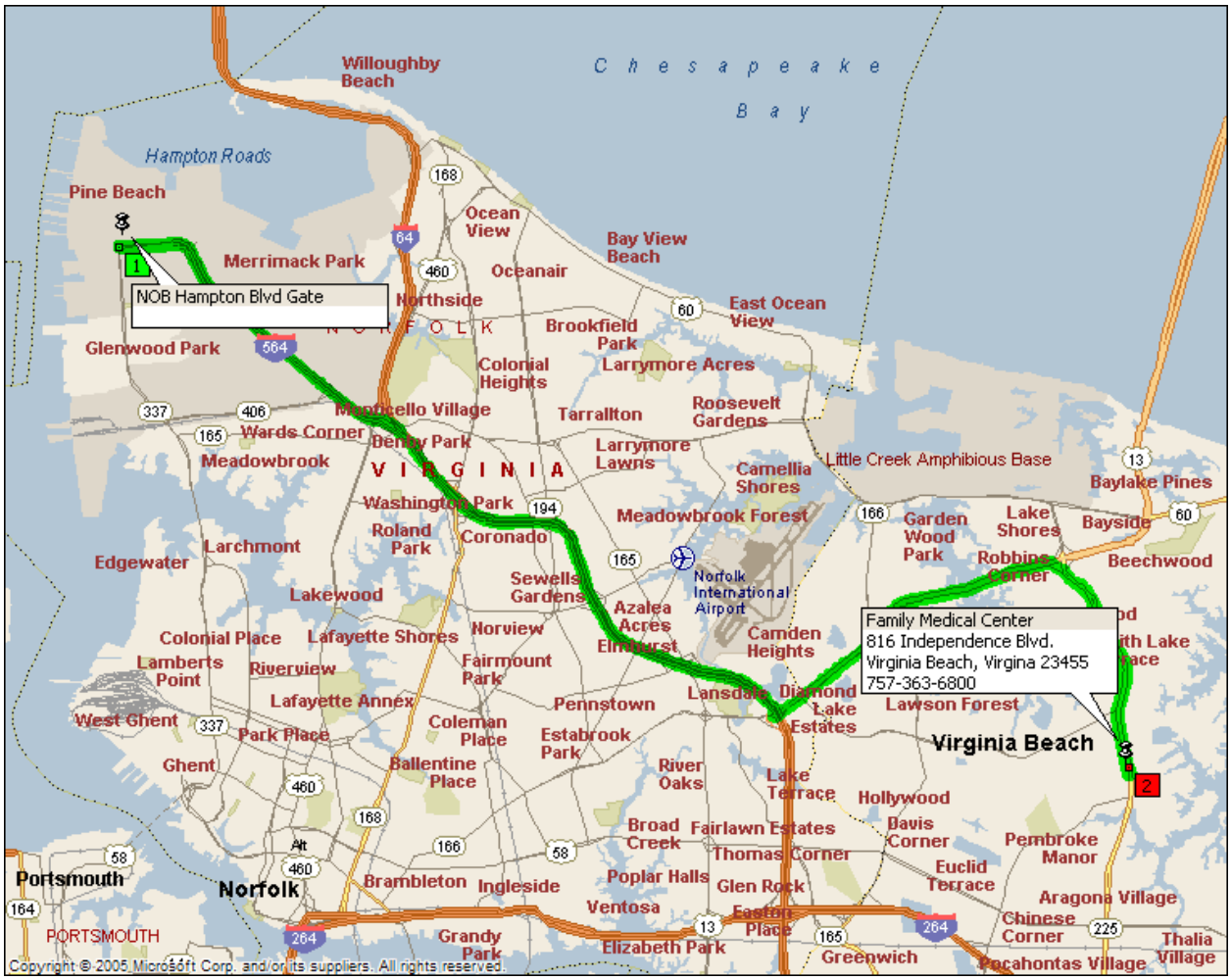
ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination (continued)	Sharp Objects/ Cuts and Punctures	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges/objects or working with hand tools • Maintain all hand and power tools in a safe condition • Keep guards in place during use • 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)	Hearing Protection	
	Repetitive Strains	• Rotate job tasks on high vibration equipment • Report equipment that produces high vibration for inspection and maintenance • Wear vibration reducing gloves		
	Strains and Sprains	• Maintain a safe stance and body position operating pressurized equipment • Avoid rushing		

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment decontamination (continued)	Low Ambient Temperature	• Provide warm rest area • Change of clothing that has become wet • Monitor for heat stress in accordance with Health and Safety Procedure HS400.		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Pressure washer	• 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 the site-specific Health and Safety Plan. • Review operations/safety manuals for all equipment utilized. • Review the all applicable Shaw Health and Safety Procedures.

APPENDIX D
DIRECTIONS TO THE HEALTH RESOURCE CLINIC AND HOSPITAL

Directions to Health Resource Clinic
Family Medical Center
816 Independence Blvd
Virginia Beach, Virginia 23455
757-363-6800



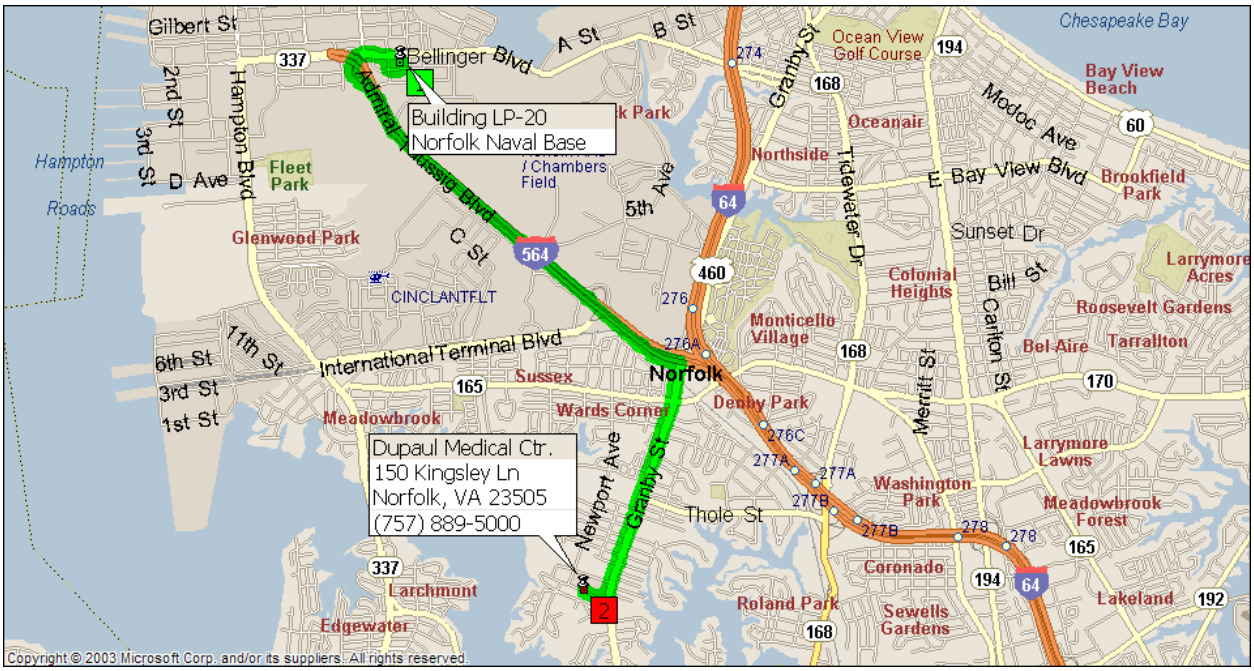
Summary: 15.0 miles (18 minutes)

Time	Mile	Instruction	For	Toward
9:00 AM	**0.0**	**Depart Hampton Blvd, Norfolk, VA 23511 on SR-337 [Admiral Taussig Blvd] (East)**	**0.6 mi**	
9:00 AM	0.6	Road name changes to I-564 [Admiral Taussig Blvd]	3.0 mi	
9:04 AM	3.6	Merge onto I-64 [Hampton Roads Beltway]	5.2 mi	
9:10 AM	8.8	At exit 282, take Ramp (RIGHT) onto US-13 [SR-166]	3.5 mi	US-13 / Northampton Blvd / Chesapeake Bay / Bridge - Tunnel
9:14 AM	12.4	Take Ramp (RIGHT) onto SR-225 [Independence Blvd]	2.5 mi	VA-225 / Independence Blvd
9:17 AM	14.9	Turn LEFT (East) onto Local road(s)	21 yds	
9:18 AM	14.9	Turn LEFT (North) onto SR-225 [Independence Blvd]	120 yds	
9:18 AM	**15.0**	**Arrive 816 Independence Blvd, Virginia Beach, VA 23455**		

SUMMARY

Driving distance: 15.0 miles

Directions to Depaul Medical Center
150 Kingsley Lane
Norfolk, VA 23505
(757) 889-5000



Summary: 4.7 miles (11 minutes)

Mile	Instruction	For	Toward
0.0	**Depart Building LP-20 on Local road(s) (South)**	**65 yds**	
0.1	Turn RIGHT (West) onto W C St, then immediately turn RIGHT (North) onto 1st Ave	0.1 mi	
0.2	Turn LEFT (West) onto Bellinger Blvd	0.1 mi	
0.3	Take Ramp onto I-564 [Admiral Taussig Blvd]	2.1 mi	I-564
2.4	Turn RIGHT onto Ramp	0.5 mi	I-64 / US-460 / Granby St / Hampton
2.9	Keep RIGHT to stay on Ramp	0.2 mi	US-460 / Granby St
3.1	Turn RIGHT (South) onto US-460 [Granby St]	1.5 mi	
4.6	Turn RIGHT (West) onto Kingsley Ln	0.1 mi	
4.7	**Arrive Dupaul Medical Ctr**		

APPENDIX E
HEALTH AND SAFETY PLAN
AMENDMENT DOCUMENTATION FORM

Site Specific Health & Safety Plan
Amendment Documentation

Project Name: **Project No.**

Amendment No. **Date:**

The Amendment Addresses the Following Sections:

Task(s) Amendment Affects:.

Reason For Amendment:

Amendment:

Completed by: **Approved by:**

APPENDIX F
HURRICANE PREPAREDNESS PLAN

Hurricane Preparedness Plan for
SWMU-14 ASPHALT COVER – REMOVAL ACTION
NAVAL STATION NORFOLK
NORFOLK, VIRGINIA

Prepared for:

DEPARTMENT OF THE NAVY

Contract No. N62470-02-3260
Task Order 120

Prepared by:

Shaw Environmental, Inc.
500 East Main Street, Suite 1630
Norfolk, Virginia 23510

Shaw Project No. 129893
May 2008

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Condition III (Landfill within 48 hours) – Hurricane Preparedness Checklist
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Condition I – Hurricane Preparedness Checklist
Resume Site Operations –Hurricane Preparedness Checklist

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1.0 INTRODUCTION

1.1 PURPOSE

This procedure outlines the general responsibilities and actions to be taken in preparation for and response to a hurricane or hurricane warnings at the SWMU-14, Q-50 Satellite Accumulation Area, Naval Station, Norfolk, Virginia site. 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.

1.2 SCOPE

This procedure is applicable to all contractor personnel, including Shaw's subcontractors, temporary construction facilities, and remediation equipment present at the SWMU-14, Q-50 Satellite Accumulation Area, Naval Station, Norfolk, Virginia site.

2-70 DISCUSSION

This procedure provides information on how to protect personnel and property in the event of a hurricane. In the Norfolk 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.

2.1 CONDITIONS OF READINESS (CORS)

Condition V - Destructive winds are possible at the SWMU-14, Q-50 Satellite Accumulation Area site within 96 hours. Normal daily jobsite cleanup and good housekeeping practices.

Condition IV - Destructive winds are possible at the SWMU-14, Q-50 Satellite Accumulation Area site within 72 hours. Normal daily jobsite 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 the SWMU-14, Q-50 Satellite Accumulation Area site within 48 hours. Maintain Condition IV requirements. Begin securing the jobsite 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 the SWMU-14, Q-50 Satellite Accumulation Area site within 24 hours or a Small Area Storm is anticipated within 6 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 jobsite. Contact client representative for weather and COR updates and completion of required actions.

Condition I - Destructive winds are possible at the SWMU-14, Q-50 Satellite Accumulation Area site within 12 hours or a Small Are Strom is imminent within 1 hour. Perform and complete all remaining actions required for lower conditions of readiness. Secure the jobsite 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 the SWMU-14, Q-50 Satellite Accumulation Area site to initiate a Condition IV alert.

Gale – Non-tropical windstorm with winds 33 to 55 knots.

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

Small Area Storms – Thunderstorms or tornadoes.

Small Area Storms Condition I - Destructive winds, heavy rain, lightening and hail are imminent within 1-hour.

Small Area Storms Condition II - Destructive winds, heavy rain, lightening and hail are expected within 6-hours.

Storm – Non-tropical windstorm with winds 33 to 55 knots.

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."

Tornado – Violent rotating columns of air with winds 100 to 250 knots.

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 – Mark Pisarcik

The Project Manager (PM) is responsible for ensuring that all adequate measures have been taken to prepare for hurricanes and to protect Shaw 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 - Rich Kilmer

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 – Rodney Alexander

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.

4.0 EMERGENCY OPERATING PROCEDURES

4.1 CONDITION V – EARLY PREPAREDNESS

The SS/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 the Building LP-20 site 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.

4.2 CONDITION IV - (DESTRUCTIVE WINDS ARE POSSIBLE WITHIN 72 HOURS)

This COR starts when Shaw is notified by the client representative that severe weather is within 72 hours of posing a threat to the project location. The SS/SSO will ensure that the following steps are taken:

- Monitor the storm and inform the PM and SS/SSO 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/SSO 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/SSO 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 which might interfere with securing operations, such as starting a major excavation, will cease.

The SS/SSO will ensure that the following steps are taken:

- Fill fuel tanks in all equipment on-site

- Secure stockpiled material on-site.
- Make sure all portable generators and light plants are operational and make arrangements to secure additional ones if needed.
- Review requirements for Condition II with all crew members.
- Maintain condition IV requirements.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition IV.

4.3 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 Building LP-20 site has generated destructive winds in other locations. The PM and SS/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 jobsite necessary for Condition I that cannot be completed within 18 hours.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition III.

4.4 CONDITION II - DESTRUCTIVE WINDS ARE ANTICIPATED WITHIN 24 HOURS OR A SMALL AREA STORM IS ANTICIPATED WITHIN 6 HOURS.

Condition II begins when destructive winds are anticipated within 24 hours, a small area storm is anticipated in 6 hours, and/or as directed by the FEAD. The PM and SS/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 jobsite.
- 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.
- Valuable records, files, and equipment will be boxed in preparation for movement to a safe location.
- Move large office equipment away from doors and windows
- Tape or board the windows in the office trailers

The SS/SO 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 jobsite
- Inform the Project Manager that all personnel are being released from the site

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition II.

4.5 CONDITION I – DESTRUCTIVE WINDS ARE ANTICIPATED WITHIN 12 HOURS OR A SMALL AREA STORM IS IMMINENT WITHIN 1 HOUR.

- Complete all remaining actions required for lower conditions of readiness.
- Secure jobsite access and evacuate to safe refuge.

See Appendix A for the Hurricane Preparedness Responsibility Checklist – Condition I.

4.6 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 SS/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/SSO. 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/SSO will meet with site personnel to discuss any corrective actions or changes in this plan.

1.0 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
Itemized Equipment Checklist, Condition III.

Equipment	Secure in Place	Remove from Project Site

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 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 fuel tanks will be filled.
- ☐ All subcontractors with equipment or supplies on-site will be notified to begin removal procedures
- ☐ Ensure all generators and lights are operational and make arrangements to secure additional ones if needed.

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
- ☐ Remove all valuable records, files, and small equipment from the trailers
- ☐ 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

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
- ☐ Move large office equipment away from doors and windows
- ☐ 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
- ☐ Tape or board trailer windows
- ☐ 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:_____

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
- ☐ Inspect trailers for structural damage. Repair as needed.
- ☐ 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:_____

ATTACHMENT B

Emergency Phone Numbers

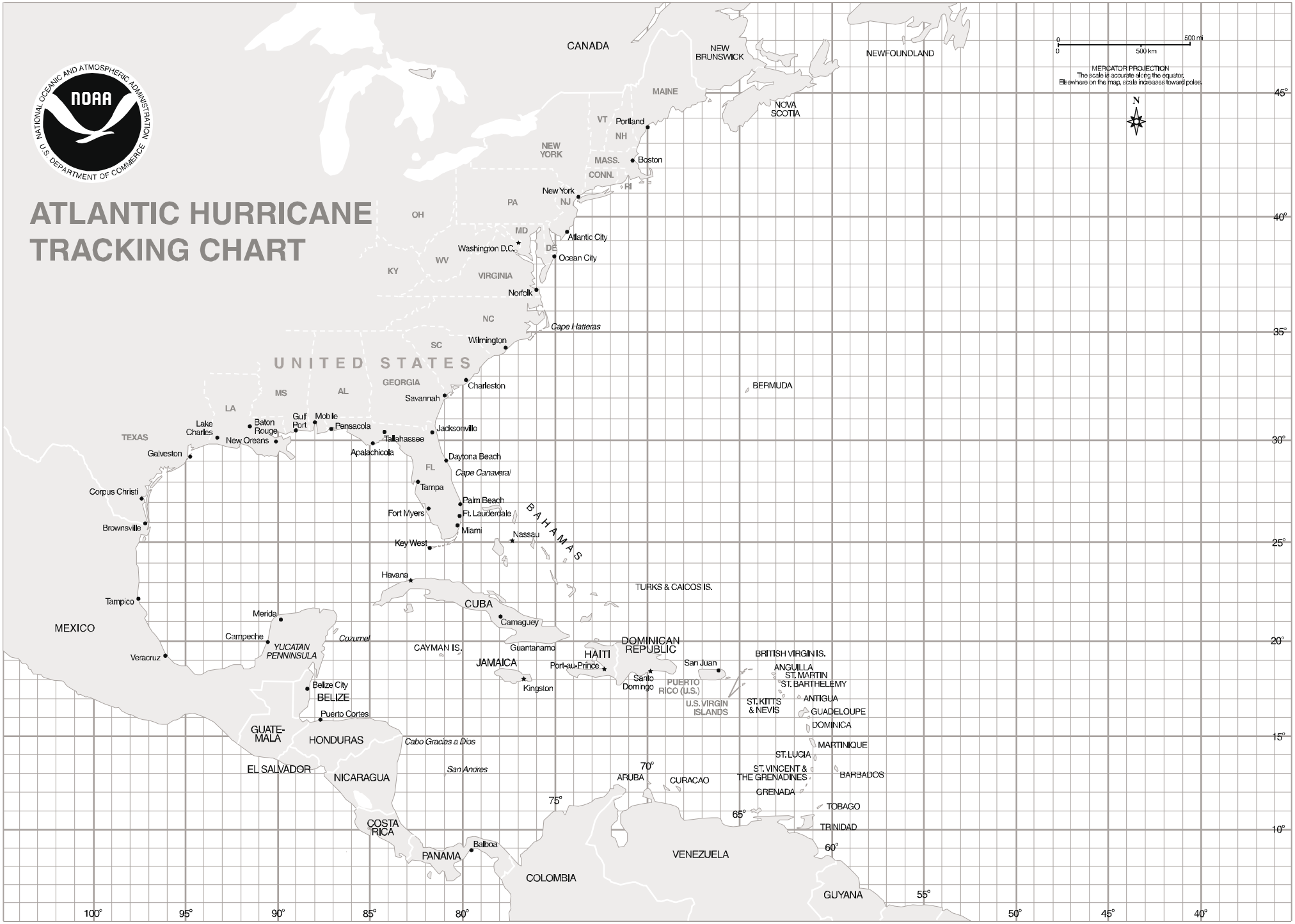
Emergency Telephone Numbers

Local Agencies – Ambulance Fire Police	 911 911 911
Hospital DePaul Medical Center 150 Kingsley Lane Norfolk, VA Health Resource Clinic Family Medical Center 816 Independence Blvd Virginia Beach, VA Directions to the Health Resource Clinic and the hospital are located in Appendix D	 (757) 889-5000 (757) 363-6800
Regional Poison Control Center	(800) 552-6337
State Agencies Virginia Department of Environmental Quality	 (757) 367-00080
Federal Agencies Agency for Toxic Substances and Disease Registry EPA Region Branch Response Center National Response Center US Coast Guard	 (215) 597-9800 (404) 347-3931 (800) 424-8802 (804) 484-8192
Navy FEAD – Sheldon Johnson	 (757) 322-4189 (office)
Shaw Personnel Project Manager – Mark Pisarcik Site Supervisor – TBD Site Safety Officer – TBD Program CIH – David Mummert, CIH Program Health & Safety Manger – Kym Edelman, CSP	 (757) 544-2085 (cellular) (757) 640-6936 (office) TBD (cellular) TBD (cellular) (419) 425-6129 (office) (419) 348-1544 (cellular) (757) 640-6950 (office) (757) 435-5384 (cellular)
Shaw Corporation (24 hour)	(866) 299-3445

ATTACHMENT C

Hurricane Tracking Map

ATLANTIC HURRICANE TRACKING CHART



APPENDIX G
ACCIDENT PREVENTION PLAN

ACCIDENT PREVENTION PLAN
FOR ACTIVITIES AT
SWMU-14, Q-50 SATELLITE ACCUMULATION AREA
NAVAL STATION NORFOLK
NORFOLK, VIRGINIA

Prepared for:

DEPARTMENT OF THE NAVY

Contract No. N62470-02-3260
Task Order 120

Prepared by:

Shaw Environmental, Inc.
500 East Main Street, Suite 1630
Norfolk, VA 23510

Shaw Project No. 129893
May 2008

ACCIDENT PREVENTION PLAN
SIGNATURE SHEET

Approved by:

David Mummert, CIH
Program Certified Industrial Hygienist (CIH)
(419) 425-6129 (office)

Approved by:

Mark Pisarcik
Project Manager
(757) 640-6936 (office)

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12.0 CONTRACTOR INFORMATION TO MEET EM 385-1-1 2

LIST OF ACRONYMS

AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
ASTM	American Society for Testing and Materials
CD	Compact Disc
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
DoD	Department of Defense
EH&S	Environmental Health and Safety
EMR	Experience Modification Rate
EMS	Emergency Medical Services
EZ	Exclusion Zone
HPP	Hurricane Preparedness Plan
HS	Health and Safety
HSM	Health and Safety Manager
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Safety and Health
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
Shaw	Shaw Environmental, Inc.
SSHSP	Site Specific Health and Safety Plan
SS	Site Supervisor
SSO	Site Safety Officer
USACE	United States Army Corps of Engineers

2.0 BACKGROUND INFORMATION

The primary site tasks include the following:

- Mobilization
- Construction Facilities Setup
- Clearing and Grading Site
- Demolition and Removal of Existing Concrete Pad
- Installation of Asphalt Cap
- Installation of Erosion and Sediment Controls
- Installation of Subgrade Storm Water Drainage Piping
- Construction of Bioretention Areas
- Installation of Parking Lot Lighting
- Equipment Decontamination
- Site Restoration
- Demobilization

Activity Hazard Analyses (AHA) have been prepared for the above activities and are included in Attachment C of the Site Specific Health and Safety Plan (SSHSP).

Shaw Environmental, Inc. (Shaw) Accident Experience

YEAR	Experience Modification Rate (EMR) (Interstate)	OSHA Recordable Incident Rate
2006	0.52	n/a
2005	0.49	1.02
2004	0.50	1.07

1.0 STATEMENT OF SAFETY AND HEALTH POLICY

CORPORATE POLICY

Subject: SAFETY

1.1 PURPOSE AND SUMMARY

It is the policy of Shaw 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 and governmental regulations.

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. 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 Shaw health and safety procedures shall be implemented for all Shaw employees on all projects where Shaw is the subcontractor, or a joint venture partner. If Shaw is the prime contractor, Shaw procedures shall be applied to all Shaw and subcontractor personnel.

The implementation of effective safety and health practices is a key measure of managerial performance. 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.

3.0 RESPONSIBILITIES AND LINES OF AUTHORITY

Safety responsibilities, accountability and lines of authority are discussed in Section 2.0 of the SSHSP. The Project Manager (PM), Site Supervisor (SSO) Site Safety Officer (SSO), Program Certified Industrial Hygienist (CIH) and Program Health and Safety Manager (HSM) are responsible for formulating and enforcing health and safety requirements, and implementing the SSHSP.

4.0 SUBCONTRACTORS AND SUPPLIERS

Each subcontractor working on the project site will be required to adhere to the SSHSP and the requirements presented below.

4.1 SUBCONTRACTOR/SUPPLIER COORDINATION AND CONTROL

All 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. Subcontractors will comply with the requirements for site safety as outlined in Shaw's Health and Safety (HS) Procedure HS011 (Attachment B of the SSHSP). The SS will be responsible for the conduct and control of Shaw subcontractors.

5.2 SUBCONTRACTOR/SUPPLIER SAFETY RESPONSIBILITIES

All subcontractor employees are subject to the same training and medical surveillance requirements as Shaw 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 Code of Federal Regulations (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 AHAs 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 SS and a copy of the subcontractor's injury/illness report shall be submitted to the SS within 24 hours.

Subcontractors are required to read and sign the SSHSP and comply with all requirements of this Accident Prevention Plan (APP). 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.

5.0 TRAINING

Outlines of the site safety orientation and training for site personnel, subcontractors and visitors are provided in Section 10.0 of the SSHSP.

5.1 MANDATORY TRAINING AND CERTIFICATIONS

Mandatory training and certifications are discussed in Section 10.0 of the SSHSP.

5.2 EMERGENCY RESPONSE TRAINING

All Shaw personnel who have completed the Shaw 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.

5.3 SUPERVISORY AND EMPLOYEE SAFETY MEETINGS

The Shaw SS 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 daily safety meetings. Daily safety meetings will comply with HS051 (Attachment B of the SSHSP).

6.0 HEALTH AND SAFETY INSPECTIONS

6.1 INSPECTIONS

The Shaw Project Manager and SS are required to conduct bi-monthly inspections of the sites using the Project Safety Inspection Report. The SS and SSO is responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, and equipment conditions and submitting them to HSM. 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 HSM representative will periodically conduct site visits and perform Site Safety Assessments. These reports are kept on file at the Virginia Beach, Virginia, office and are tracked in a database for each Shaw Project Manager and SS, 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.

External Inspections/Certifications
Shaw does not anticipate, but may consider the use of outside sources, to provide safety inspections on an as necessary basis.

As required, safety equipment will comply with appropriate regulations of 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), United States Coast Guard (USCG), or other recognized certification organizations.

7.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

Shaw 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 that minimizes the probability of near misses, equipment/property damage or injury. Shaw will establish programs to recognize people and projects that demonstrate excellence in safety performance. Shaw 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 site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. Shaw will provide and enforce safety rules to protect employees, subcontractors, clients and the public.

7.1 SHAW SAFETY INCENTIVE PROGRAMS:

A copy of the Shaw Safety Incentive Award Program will be available at each project. The Shaw Project Manager will develop a site-specific program for approval by the HSM and the LANTDIV program Manager within 10 days of project mobilization.

7.2 SHAW 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 personnel will follow the policies set forth in the Shaw Health and Safety Procedures HS001-999 (Available on site on compact disc [CD]). Site personnel concerned with any aspect of health and safety shall bring it to the attention of the SS. 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 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 Employee Safety Responsibility is fully detailed in HS010 Employee Safety and Health Work Rules (Attachment B of the SSHSP).

7.3 MANAGERS AND SUPERVISORS SAFETY ACCOUNTABILITY

It is the duty of the first line supervisor to motivate employees to adhere to Shaw'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 that involved site employees or contractors.
- Ensure that the employees are outfitted with and wear personal protective equipment (PPE) as specified by this APP, SSHSP, other Shaw procedures or as directed by the 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 Safety Improvement process, which promotes awareness, encourages participation and recognizes excellence.

8.0 ACCIDENT REPORTING

8.1 EXPOSURE DATA (MAN-HOURS WORKED)

The Shaw's Environmental Health and Safety (EH&S) Manager tracks and maintains incident records as to Federal reporting requirement. Incident rates are reported monthly to the Shaw's EH&S Manager. Incident Rates and Workers Compensation losses are tracked for each business line. LANTDIV program incident rates are reported monthly by the Program HSM.

8.2 ACCIDENT INVESTIGATIONS, REPORTS AND LOGS

The SS and SSO conduct accident/incident investigations. A report is completed by the SS and it must be submitted to the Shaw Baton Rouge, Louisiana Safety Department within 24 hours. All incident reporting forms are provided in HS020.

8.3 IMMEDIATE NOTIFICATION OF MAJOR INCIDENTS

Shaw 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.

8.1 ACCIDENT 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 SS 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.

MEDICAL SUPPORT
On-site Medical Support/Off-site Medical Arrangements will be outlined in Section 9.0 of the SSHSP.

11.0 PERSONAL PROTECTIVE EQUIPMENT

Protection levels provided in the SSHSP 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. PPE selection criteria are outlined in HS600 and HS601 (Attachment B of the SSHSP).

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 (Attachment B of the SSHSP).

11.0 PLANS REQUIRED BY THE SAFETY MANUAL

11.1 HAZARD COMMUNICATION PROGRAM

The Site-Specific Hazard Communication Program is included Section 4.2 of the SSHSP. Shaw Hazard Communication Program complies with 29 CFR 1926.59/1910.1200 and is outlined in HS060 (Attachment B of the SSHSP).

11.2 EMERGENCY RESPONSE PLANS

The Emergency Response and Contingency Plan is included in Section 9.0 of the SSHSP.

11.3 LAYOUT PLANS

Work zones are defined in Section 5.0 of the SSHSP.

11.4 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. 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, SSO, CIH, HSM, and SSO will also evaluate the implementation of the SSHSP, periodically, to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

11.5 CONTINGENCY PLAN FOR SEVERE WEATHER

Contingency plans for severe weather are included in Section 9.0 of SSHSP. A Hurricane Preparedness Plan (HPP) is located in Attachment G of the SSHSP.

11.6 ALCOHOL AND DRUG ABUSE PREVENTION PLAN

Shaw substance abuse procedures are outlined in Shaw HS101 – Drug, and Alcohol Testing.

12.0 CONTRACTOR INFORMATION TO MEET THE REQUIREMENTS OF THE MAJOR SECTIONS OF EM 385-1-1

In addition to this APP, Shaw has prepared a SSHSP to meet the major requirements of United States Army Corps of Engineers (USACE) Manual 385-1-1. Additional procedures for major requirements are provided in the Shaw Health and Safety Procedures Manual HS001-999 (Available on site on CD).

APPENDIX H
SAFETY PLAN ACKNOWLEDGEMENT

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

.

I have been informed of, and will abide by, the procedures set forth in the SSHSP developed for the removal activities at SWMU-14, Q-50 Satellite Accumulation Area at the Naval Station, Norfolk, Virginia. I have also been provided with an opportunity to read this SSHSP and the hazard communication program. I also have been properly trained, medically monitored, and fit tested for the work that I am to perform.

Name	**Date**

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

I have been informed of, and will abide by, the procedures set forth in the SSHSP developed for the removal activities at SWMU-14, Q-50 Satellite Accumulation Area at the Naval Station, Norfolk, Virginia. I have also been provided with an opportunity to read this SSHSP and the hazard communication program. I also have been properly trained, medically monitored, and fit tested for the work that I am to perform.

Name	**Date**

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Name	**Date**

APPENDIX I
OSHA 300 LOG

OSHA's Form 300A
Summary of Work-Related Injuries and Illnesses

Year _____

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days of job transfer or restriction	Total number of days away from work
0	0
(K)	(L)

Injury and Illness Types

Total number of…

	(M)		
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) All other illnesses	0
(3) Respiratory Condition	0		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

_____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

____ ____ ____ ____

Employment information

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ Company executive

_____ Title

_____ Phone

_____ Date

OSHA's Form 300

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 2008

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case										
						Using these categories, check ONLY the most serious result for each case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:				
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Remained at work		On job transfer or restriction (days)	Away from work (days)	(M) Injury	Skin Disorder	Respiratory Condition	Poisoning	All other illnesses
								Job transfer or restriction	Other record-able cases							
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)
					Page totals	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Injury | Skin Disorder | Respiratory Condition | Poisoning | All other illnesses

(1) (2) (3) (4) (5)

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 301
Injuries and Illnesses Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone _____ Date _____

Information about the employee

1) Full Name _____

2) Street _____

City _____ State _____ Zip _____

3) Date of birth _____

4) Date hired _____

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional

_____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ Zip _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the Log _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness _____

12) Time employee began work _____ AM/PM

13) Time of event _____ AM/PM ☐ Check if time cannot be determined

14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was spayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt", "pain", or "sore." Examples: "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

18) **If the employee died, when did death occur?** Date of death

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Appendix D

Quality Control Plan

Shaw® Shaw Environmental, Inc.

TASK ORDER 0120
QUALITY CONTROL PLAN
FOR
SWMU 14 ASPHALT COVER - REMOVAL ACTION
NAVAL STATION NORFOLK
NORFOLK, VIRGINIA

Prepared for:

DEPARTMENT OF THE NAVY
NAVFAC Mid-Atlantic
Norfolk, VA

Contract No. N62470-02-D-3260
Task Order No. 0120

Prepared by:

Shaw Environmental, Inc.
500 E. Main Street, Suite 1630
Norfolk, Virginia 23510

Mark Pisarcik
Project Manager

Ernest P. Duke
Program QC Manager

James A. Dunn, Jr., P.E.
Program Manager

May 2008
Shaw Project 129893

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STATEMENT OF QC PROGRAM

This Site Specific Addendum to the Program QC Plan is prepared and submitted for Task Order 0120, SWMU 14 Asphalt Cover – Removal Action, Naval Station, Norfolk, Virginia. This plan incorporated methods and procedures from the Program Quality Control Plan approved by the Atlantic Division, Naval Facilities Engineering Command (NAVFAC). The Program Quality Control Plan was developed specifically to be responsive to the Contract Specification, Contract No. N62470-02-D-3260. Shaw Environmental, Inc. (Shaw) will perform the inspections and tests required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements.

Note to Employees – Concept of Quality Control

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 provides a quality product and customer satisfaction. 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 people 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 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 Site QC Manager will have the authority to implement and manage the QC Plan, the three phases of quality control and the authority to stop work, which is not in compliance with the contract.

The QC Manager for this task order will be Louie McTall. Mr. McTall will function as the QC Manager for this task order under the direction and oversight of Mr. Ernie Duke, Shaw Program QC Manager. Mr. McTall maintains current US Army Corps of Engineers (USACE) Construction Quality Management for Contractors, QC certification.

The QC Manager will work closely with the Project Manager, but will report directly to Mr. Duke regarding QC related issues on the site. Mr. Duke will serve to resolve any QC related issues, which need his involvement. The Site QC Manager will have a direct line of communication to Mr. Duke on all QC related issues.

The relationship between the QC organization, and production personnel of the task order, is provided in the Organizational Chart, Figure I-1.

II. IDENTIFICATION OF PERSONNEL ASSIGNED TO THE QC ORGANIZATION

The resume of the Site QC Manager is provided as Figure II-1.

III. APPOINTMENT LETTER

The Site QC Manager appointment letter is presented as Figure III-1.

IV. OUTSIDE ORGANIZATIONS

A list of outside organizations such as subcontractors employed by Shaw for work under this task order is provided in Exhibit IV-1. This list provides each firm's name and address and a description of the services each firm will provide. This list will be maintained current and will be available for review.

V. INITIAL SUBMITTAL REGISTER & REVIEWER

V.1 Submittal Register

The Initial Submittal Register is provided as Exhibit V-1. The status of each submittal will be recorded and maintained by the QC Manager. The Submittal Register will be submitted at the end of each month.

V.2 Personnel Authorized to Review and Certify Submittals

Personnel authorized to review and certify submittals other than the Site QC Manager are identified on Exhibit V-2. The QC Manager shall perform the final review and approval/certification for all submittals. 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 Program QC Plan Section 1, part 4.7, Construction Testing.

VII. TESTING PLAN & LOG PREPARATION

A Testing Plan and Log has been prepared for this task order and is provided as Exhibit VII-I.

VIII. REWORK ITEMS

Rework Items will be documented on the Daily QC Report and on the Rework Items Log. This will be used to report and track rework Items. The Rework Items Log will be submitted at the end of each month.

IX. DOCUMENTATION PROCEDURES

The Daily QC Report form and Daily Production Report form will be used to document daily activities at the site. Documentation will be completed as discussed in Section 1, Parts 4.5 and 4.9 of the Program QC Plan.

X. QUALITY CONTROL INSPECTION PLAN

The Quality Control Inspection Plan, Exhibit X-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 performed, the Site QC Manager will record the corresponding checklist/report number and date.

Note: A definable feature of work is a task, which is separate, and distinct from other tasks and requires separate control procedures.

This list has been prepared to correspond to the activities of the project schedule. It will be maintained as provided in Section 1, Part 4.4 of the PQCP. The list 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.

XI. PERSONNEL MATRIX

The Site QC Manager will prepare and maintain the personnel matrix, Exhibit XI-1, showing each section of the task order specification with identification of who will review and certify 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 and will be available for review.

FIGURES

FIGURE I-1

QC ORGANIZATIONAL RELATIONSHIP WITH PRODUCTION PERSONNEL SHAW ENVIRONMENTAL INC., TASK ORDER NO. 0120

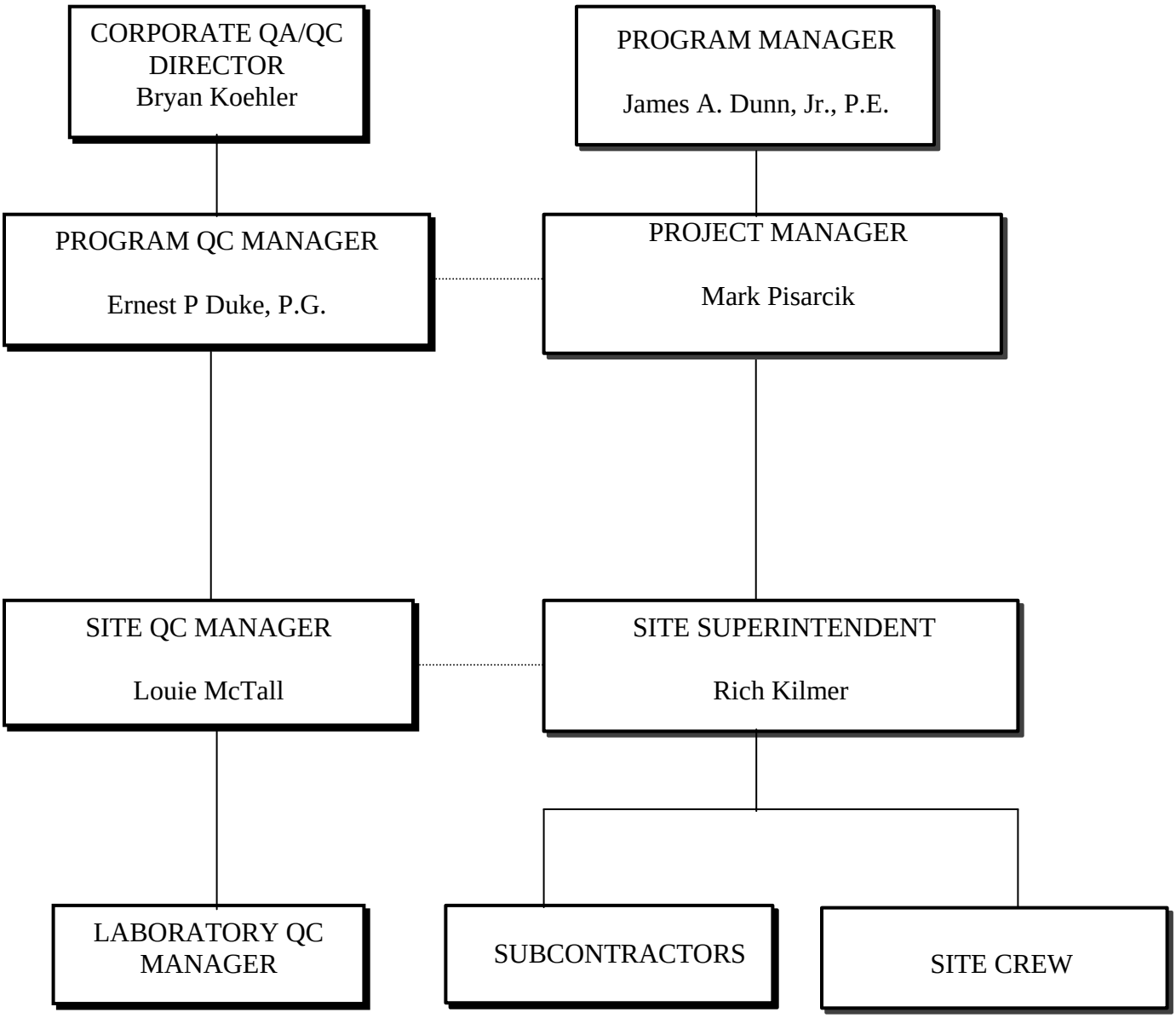

Figure II-1
Site QC Manager Resume

QC Manager - Louie McTall

Last Updated: 18 Dec 2007

Louie A. McTall

Professional Qualifications

Mr. McTall is an Engineer II providing assistance in the areas of technical documentation, technical consultation, field services, and site supervision. He has written and edited several technical documents including contract work plans, closure reports, and operations and maintenance manuals. He has experience with technical troubleshooting and new piping and equipment specification in water treatment plants. His sample collection experience includes groundwater, surface water, soil, and geotechnical samples at various remediation sites. Mr. McTall's supervision experience includes oversight of several sampling projects and upgrades performed at an overseas water treatment facility.

Education

Bachelor of Science, Mechanical Engineering, University of Virginia, Charlottesville, Virginia, 2004

Additional Training/Continuing Education

8-Hour Hazardous Waste Operations and Emergency Response Refresher, Shaw E&I, 2007
Lean Six Sigma Overview Training, Shaw E&I, 2007
OSHA Disaster Site Worker, Shaw E&I, 2006
Competent Person: Drilling Oversite, Shaw E&I, 2006
Ground Shipping of Hazardous Materials, Shaw E&I, 2006
Air Shipment of Dangerous Goods - IATA, Shaw E&I, 2005
U.S. Army Corps of Engineers Construction Quality Management for Contractors, TranSystems Corp., 2005
8-Hour Hazardous Waste Operations and Emergency Response Supervisor, Shaw E&I, 2005
Confined Space Entry Supervisor, Shaw E&I, 2005
Excavation Competent Person, Shaw E&I, 2005
10-Hour Construction Safety and Health, Shaw E&I, 2005
Site Safety Officer, Shaw E&I, 2005
40-Hour Hazardous Waste Operations and Emergency Response, Reactives Management Corp., 2004

Registrations/Certifications/Licenses

Erosion and Sediment Control Responsible Land Disturber, 2007, 27981, Active, Virginia, 08/2010
Engineer in Training, 2005, 0420-055057, Active, Virginia

Experience and Background

08/2005 - Present
Engineer II, Shaw Environmental & Infrastructure, Inc., Norfolk, Virginia

Perform a variety of engineering work in the planning, design, procurement, and construction

phases of projects. Duties include collection and interpretation of data, performance of detailed engineering, preparation of engineering and environmental reports, bid specifications, environmental plans, communication with regulatory agencies, and environmental permitting.

The following is a summary of key projects:

Project Engineer, Small Arms Range Studies, 128451, Air Force Center for Engineering and the Environment, Various AFSPC Bases, 09/2007 - Present

Project consists of visiting various Air Force Space Command bases and providing third party assessment of their existing small arms ranges. Duties include identifying deficiencies, interviewing stakeholders, formulating corrective actions, and presenting the results to the base leadership. After selection of a preferred corrective action, the project is concluded by preparing a 15% conceptual design report for each base.

Engineer / QC Manager, UST Repairs and Upgrades, 124521, Department of the Navy - DESC, Naval Station Norfolk, 11/2006 - Present

This project included performing mechanical upgrades to two underground fuel storage tanks. Responsibilities included preparation of work plan & construction drawings, material & equipment specifications, subcontractor supervision, coating inspections, serving as project QC manager, and preparing the work completion report.

Project Engineer, Assistant Project Manager, SPCC Upgrades, 115749, Department of the Navy - Atlantic Division, Marine Corps Base Camp Lejeune, $5,800,000.00, 11/2005 - Present

This project includes remedial construction activities as required for compliance with the recently enacted Spill Prevention, Control and Countermeasure (SPCC) at Marine Corps Base Camp Lejeune and Marine Corps Air Station New River. Activities include upgrades to existing above ground fuel tanks, installation of new above ground fuel tanks, construction of stormwater containment structures, and construction of loading/unloading pads and containment.

Responsibilities included: establishing a method for tracking work required and work completed at approximately 750 AST sites, documenting all changed conditions and resulting cost impacts, updating base GIS to reflect upgrades performed, coordinating procurement of materials and subcontractors, assisting in field management of a 20-30 person crew, and assisting in project management duties including monthly reporting and cost scheduling.

Engineer, Building LP-20 Plating Shop, 801458, Department of the Navy - Atlantic Division, Naval Station Norfolk, 02/2007 - 12/2007

This project included removal of contaminated brick and debris from a former metal plating shop and construction of a 9,500 square foot concrete pad. Responsibilities included preparation of work plan & construction drawings, material and equipment specifications, and characterization sampling of hazardous waste.

Engineer / QC Manager, Existing Landfill Closure, 110050, Department of the Navy - Atlantic Division, Roosevelt Roads, Puerto Rico, 06/2007 - 07/2007

Closure of a 50 acre landfill consisting of waste regrading and installation of an 18 inch clay cap and 6 inch vegetative cover. Responsibilities included performing site surveys using robotic total station surveying equipment, coordinating geotechnical sampling and reporting, assisting with supervision of a 20 person local subcontractor field crew, and conducting weekly update meetings with the client.

Engineer, POL Removal Action - Site 3 NSA, 126833, Department of the Navy - Atlantic Division, Naval Submarine Base New London, 05/2007 - 06/2007

Prepared cost estimate and work plan for this project involving removal of TPH contamined soils.

Engineer, UST Remediation at Housing Sites, 126991, Department of the Navy - Atlantic Division, Naval Submarine Base New London, 05/2007 - 06/2007
Prepared cost estimate and work plan for this project involving remediation of former UST sites. Remediation techniques include UST removal, excavation of contaminated soils, and bio-venting to reduce contaminant levels.

06/2004 - 08/2005
Assistant Engineer, Shaw Environmental & Infrastructure, Inc., Virginia Beach, Virginia

Under direct supervision, performs engineering and scientific tasks of a routine nature. Works on a wide variety of technical projects from investigation through remediation/construction. Some duties include: compile data for project reports, write and edit project reports, collect and compile field data as required, assist in sampling activities, document technical data for management review, supervise on-site project activities, and provide other entry level duties as assigned.

The following is a summary of key projects:
Engineer, Paradise Creek Removal Action, 116539, Department of the Navy - Atlantic Division, Portsmouth, Virginia, 07/2005 - 12/2005
Assisted in preparing estimates for construction and demolition activities. Prepared the Draft and Final Work Plans for submittal to the Navy. This included writing the Work Plan text, Quality Control Plan, Erosion & Sediment Control Plan, and Nuisance Water Management Plan. Reviewed the Health and Safety Plan, Field Sampling Plan, and all design drawings/figures.

Engineer, Scrap Metal Yard Recycling and Disposal Activities, 116809, Department of Defense - Harvey Point Defense Testing Activity, Hertford, North Carolina, 07/2005 - 11/2005
Prepared the Draft and Final Work Plans for the project which included debris removal, demolition of a portion of taxiway, and the construction of a new 30,000 square foot concrete pad. Work Plan preparation entailed writing the Work Plan text, reviewing the Health and Safety Plan, and coordinating with the CAD department on all figures and construction drawings.

Engineer, Yorktown Fuel Farm Water Treatment Plant, 101733 / 115274, Department of the Navy - Atlantic Division, Yorktown, Virginia, 06/2005 - 11/2005
Specified, prepared request for quote, and selected vendors for new sludge dewatering system including a 40 cubic foot filter press and two diaphragm feed pumps. Conducted troubleshooting and specification of various equipment including centrifugal pumps, flow elements, float switches, level gauges, control valves, discharge pipe sizing, supports, and thermal expansion. Participated in monitoring well installation activities and monthly well sampling events. Calculated effectiveness and expected lifetime of organo-clay and granular activated carbon filter media. Aided in preparing Quarterly Monitoring Reports.

Engineer, Camp Allen Water Treatment Plant, 101161 / 112825, Department of the Navy - Atlantic Division, Norfolk, Virginia, 06/2004 - 11/2005
Researched equipment and compiled information for Operations & Maintenance manual. Conducted troubleshooting of malfunctioning equipment including flow elements, control valves, pH sensors, and PLC auto-dialer. Prepared requests for quote, contacted vendors, compared bids, and chose vendors for GAC filter media and sand filter media change-outs. Prepared Monthly Progress Reports for submittal to the Navy.

Engineer, Interim Removal Action at Camp Peary Site 60, 115722, Department of the Navy -

Atlantic Division, Williamsburg, Virginia, 05/2005 - 06/2005
Prepared the Draft & Final Work Plans and Draft & Final Closure Reports for this project which included the removal of lead-based paint on the interior of two swimming pools and the excavation of lead contaminated soil and piping. Work Plan preparation included writing the Work Plan text, Quality Control Plan, and Erosion & Sediment Control Plan as well as reviewing the Health and Safety Plan, Field Sampling Plan, and all design drawings/figures.

Engineer, Remediation of Cheatham Annex Site 1, 114903, Department of the Navy - Atlantic Division, Yorktown, Virginia, 03/2005 - 04/2005
Prepared Draft & Final Work Plans and Draft & Final Closure Reports for this project involving excavation of contaminated soils, site restoration, and beach replenishment. Work Plan prep included writing the Work Plan text, Quality Control Plan, and Erosion & Sediment Control Plan as well as reviewing the Health and Safety Plan, Field Sampling Plan, and all design drawings/figures.

Field Engineer & Supervisor, Reverse Osmosis Treatment Plant Upgrades, 100385, Department of the Navy - Atlantic Division, Manama, Bahrain, 09/2004 - 03/2005
This project entailed performing upgrades to a reverse osmosis water treatment plant at Naval Support Activity Bahrain including new equipment installation, piping reconfiguration, and installation of new PLC and computer control system.

Assisted in preparation of Final Work Plan for submittal to the Navy including oversight of construction drawing preparation. Assisted in equipment specification and procurement including in-line instrument for measuring conductivity, chlorine, turbidity, pressure, level, and flow. Directly supervised on-site project execution and prepared daily progress and quality control inspections/reports.

Field Engineer & Supervisor, Building LP-20 Plating Shop Sampling Event, 801458, Department of the Navy - Atlantic Division, Norfolk, Virginia, 12/2004 - 01/2005
Provided on-site supervision for a "level C" sampling event that included concrete core drilling and direct push soil sampling.

Figure III-1
Site QC Manager/Representative – Letter of Appointment

QC Manager - Louie McTall

Figure III-1
Site QC Manager/Representative – Letter of Appointment

Shaw Environmental, Inc.

May 27, 2008

Shaw Environmental, Inc.
500 E. Main Street, Suite 1630
Norfolk, VA 23510

RE: Site QC Manager
Contract N62470-02-D-3260
Task Order No. 0120, SWMU 14 Asphalt Cover

Dear Mr. McTall:

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 Plans.

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 me for resolution of quality issues when working in the capacity of Quality Control Manager.

If you have any question in this matter, please contact me at 412 601-1086 or at Ernie.Duke@Shawgrp.com.

Respectfully,

Ernest P. Duke

Ernest P. Duke
Program QC Manager
NAVFAC RAC Program

EXHIBITS

EXHIBIT IV-1

SUBCONTRACTOR LIST Shaw Environmental, Inc. SWMU 14 Asphalt Cover - Removal Action Naval Station Norfolk, Norfolk, Virginia Task Order No. 0120	
COMPANY NAME AND ADDRESS	**DESCRIPTION OF SERVICES PROVIDED**
Miss Utility	Utility Locations
Spectra Group, Inc	Utility Location
Spectra Group, Inc	Site Survey
Accutest Laboratories	Chemical Analytical Testing
TBD	Waste Transportation Services
TBD	Waste Disposal Services
TBD	Asphalt Placement
TBD	Line Painting for Parking Lot
TBD	Licensed Driller for well relocation (if necessary)
TBD	Compaction / Geotech Testing
TBD	Electrical Work/Light Pole Installation

EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120 Contract No. N62470-02-D-3260	Project No. 129893 Project Title: SWMU 14 Asphalt Cover - Removal Action	Revision No. 01 Shaw Environmental, Inc.

							Contractor Action			Approving Authority					
Spec. Sect.	SD Number and Submittal Description	Spec Paragraph Number	Approving Authority	Other Reviewers	Transmittal Control No.	Planned Submittal Date	Action Code	Date of Action	Date Forwarded to Appr Auth/ from Contr	Date Forward to Other Reviewer	Date Rcvd from Other Reviewer	Action Code	Date of Action	Date Rcvd from Appr Auth	Remarks
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
01 14 00	**SD-01 Preconstruction Submittals**														
	Completed Special Access Determination (NAVSEA 5510/15)		G												
	Contractor regulations		G												
	Purchase orders		G												
	List of Contact Personnel	1.4.1.1	G												
	Personnel List		G												
	Vehicle List		G												
	Statement of Acknowledgement Form SF 1413		G												
01 20 00.00 20	**SD-01 Preconstruction Submittals**														
	Schedule of Prices	1.3	G												
01 30 00	**SD-01 Preconstruction Submittals**														
	List of contact personnel	1.5.1	G												
	View location map	1.2	G												
	Progress and completion pictures	1.3	G												
	Personnel List		G												
	Vehicle List		G												
	Statement of Acknowledgement Form SF 1413														
01 33 00	**SD-01 Preconstruction Submittals**														
	Submittal register	1.3.1	G												
01 35 29	**SD-01 Preconstruction Submittals**														
	Accident Prevention Plan (APP)	1.7	G A												
	Activity Hazard Analysis (AHA)	1.8	G A												
	SD-06 Test Reports														
01 35 29	Reports	1.12													
	Accident Reports	1.12.1													
	Monthly Exposure Reports	1.12.3													
	Regulatory Citations and Violations														
	SD-07 Certificates														
	Confined Space Entry Permit	1.9													
	Hot work permit	1.9													
	Contractor Safety Self-Evaluation Checklist	1.4	G A												
	Machinery & amp; Mechanized Equipment Certification Form	3.4.2													
01 35 40.00 20	**SD-01 Preconstruction Submittals**														

EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120 Contract No. N62470-02-D-3260	Project No. 129893 Project Title: SWMU 14 Asphalt Cover - Removal Action	Revision No. 01 Shaw Environmental, Inc.

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Environmental Protection Plan	1.8	G												
	SD-06 Test Reports														
	Field Quality Control Reports	3.2													
	SD-07 Certificates														
	Environmental Regulatory Requirements	1.6													
	SD-08 Manufacturer's Instructions														
	Material Safety Data Sheets	1.7.1													
01 45 00.00 20	**SD-01 Preconstruction Submittals**														
	Construction Quality Control (QC) Plan	1.6.1	G												
01 50 00	**SD-01 Preconstruction Submittals**														
	Construction Site Plan	1.4	G												
	Traffic Control Plan	3.3.1	G												
01 57 19.00 20	**SD-01 Preconstruction Submittals**														
	Preconstruction Survey	1.5.1	G												
	Solid Waste Management Plan and Permit	3.3	G												
	Regulatory Notification	1.5.2	G												
	Environmental Protection Plan	3.1	G												
	Storm Water Pollution Prevention Plan	3.2.2.1	G												
	Storm Water Notice of Intent (for NPDES coverage under the general permit for construction activities)	3.2.2.1	G												
	Contractor Hazardous Material Inventory Log	3.4.1	G												
	Contractor Hazardous Material Inventory Log	3.5	G												
	Storage Inventory Form		G												
	Dirt and Dust Control Plan	3.13.1	G												
	SD-06 Test Reports														
	Laboratory Analysis	3.4.2													
	Disposal Requirements														
	Erosion and Sediment Control Inspection Reports	3.2.2													
	Storm Water Inspection Reports for General Permit	3.2.2													
01 57 19.00 20	**SD-11 Closeout Submittals**														
	Waste Determination Documentation	3.4													
	Disposal Documentation for Hazardous and Regulated Waste	3.5.1													
	Contractor 40 CFR Employee Training Records	1.5.5													

EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120
Contract No. N62470-02-D-3260

Project No. 129893
Project Title: SWMU 14 Asphalt Cover - Removal Action

Revision No. 01
Shaw Environmental, Inc.

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Solid Waste Management Report	3.3.1													
	Contractor Hazardous Material Inventory Log	3.4.1	G												
	Contractor Hazardous Material Inventory Log	3.5	G												
	Hazardous Waste/Debris Management	3.12.1													
01 58 00	**SD-02 Shop Drawings**														
	Preliminary one line	1.3.1.1	G												
	Preliminary drawing indicating layout and text content	1.4.1	G												
	SD-04 Samples														
	Final Rendering	1.3.1.2	G												
	Final Framed Rendering	1.3.1.3	G												
01 77 00.00 20	**SD-11 Closeout Submittals**														
	As-Built Drawings	1.5.1	G												
	Record of Materials	1.5.3	G												
	Utility As-Built Drawings	1.5.2	G												
	Equipment/Product Warranty Tag	1.6.2	G												
	Hazardous Material Reporting	1.3.1	G												
	Certification of EPA Designated Items	1.4	G												
	Form DD1354		G												
	Checklist for Form DD1354		G												
02 41 00	**SD-01 Preconstruction Submittals**														
	Existing Conditions	1.6.2	G												
	SD-07 Certificates														
	Demolition Plan	1.8	G												
	Notifications	1.4.1	G												
	SD-11 Closeout Submittals														
	Receipts														
02 61 13	**SD-02 Shop Drawings**														
	Disposal area acceptance letters		G												
	SD-03 Product Data														
	Contaminated Soil Handling Plan		G												
	SD-06 Test Reports														
	Sampling of Stored Material	3.3.1	G												
03 30 00.00 20	**SD-02 Shop Drawings**														
	Formwork	1.6.2.1													
	Reinforcing Steel	1.6.2.2	G												
	SD-03 Product Data														

EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120 Contract No. N62470-02-D-3260	Project No. 129893 Project Title: SWMU 14 Asphalt Cover - Removal Action	Revision No. 01 Shaw Environmental, Inc.

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Plastic Forms														
	Carton Forms														
	Recycled Aggregate Materials														
	Cement	2.4.1													
	Reinforcement	2.5													
	Vapor retarder														
	Vapor barrier														
	Wood Forms	2.1.1													
	Local/Regional Materials	1.7.1													
	Biodegradable Form Release Agent	2.4.7													
	SD-05 Design Data														
	Mix design	2.3.2	G												
	Calculations	1.6.1.1													
	SD-06 Test Reports														
	Concrete mix design	1.6.4.1	G												
	Fly ash	1.6.4.2													
	Pozzolan	1.6.4.2													
	Ground iron blast-furnace slag	1.6.4.3													
	Aggregates	1.6.4.4													
	Fiber-reinforced concrete	1.6.4.5													
	Tolerance report														
	Compressive strength tests	3.7.2.3													
	Unit weight of structural	3.7.2.5													
	Lightweight Concrete														
	Ion Concentration	3.7.2.6													
	Air Content	3.7.2.4													
	SD-07 Certificates														
	Curing Concrete Elements	1.6.3.1													
	Pumping Concrete	1.6.3.2													
	Silica fume manufacturer's representative	1.6.3.3													
	Finishing plan														
	Form removal schedule	1.6.3.4													
	Biodegradable Form Release Agent	2.4.7													
	VOC Content for form release agents, curing compounds, and concrete penetrating sealers	1.6.3.5													
	Material Safety Data Sheets	1.6.3.6													
	Forest Stewardship Council (FSC) Certification	1.6.3.6													
	SD-08 Manufacturer's Instructions														

EXHIBIT V-1

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Task Order No. 0120
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Project No. 129893
Project Title: SWMU 14 Asphalt Cover - Removal Action

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Fly ash	1.6.4.2													
	Ground iron blast-furnace slag	1.6.4.3													
03 40 00.00 10	**SD-01 Preconstruction Submittals**														
	Quality Control Procedures	1.5.2.2													
	SD-02 Shop Drawings														
	Standard Precast Units	1.4.1	G												
	Custom-Made Precast Units	1.4.2	G												
	SD-03 Product Data														
	Standard Precast Units	1.4.1													
	Proprietary Precast Units	1.4.3													
	Embedded Items	3.1.3													
	Accessories	2.1.11													
	SD-05 Design Data														
	Design Calculations	1.4.2													
	Concrete Mix Proportions	1.4.5.1													
	SD-06 Test Reports														
	Test Reports	1.5.2.2													
	SD-07 Certificates														
	Quality Control Procedures	1.5.2.2													
26 56 00	**SD-01 Preconstruction Submittals**														
	Training Plan		G												
	SD-02 Shop Drawings														
	Luminaire drawings	1.5.1.1													
	Poles	1.5.1.2													
	Pole brackets for lighting fixtures														
	SD-03 Product Data														
	High-pressure sodium (HPS) lamps	2.2.2	G												
	CWA Ballasts		G												
	Lighting Contractor	2.4	G												
	Photocell switch	2.5	G												
	Fiberglass poles	2.7	G												
	Brackets	2.8													
	SD-06 Test Reports														
	Test data for luminaires		G												
	Operating test														
	SD-11 Closeout Submittals														
	Information Card		G												
31 00 00	**SD-01 Preconstruction Submittals**														
	Shoring	3.4	G												

EXHIBIT V-1

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Dewatering Work Plan	1.8	G												
	SD-03 Product Data														
	Utilization of Excavated Materials	3.7	G												
	Opening of any Excavation or Borrow Pit														
	SD-06 Test Reports														
	Testing	3.15													
	Borrow Site Testing	2.1													
	SD-07 Certificates														
	Testing	3.15													
31 05 19	**SD-03 Product Data**														
	Thread	2.1.2													
	Manufacturing Quality Control	2.2													
	Sampling and Testing														
	SD-04 Samples														
	Quality Assurance Samples and Tests	3.1													
	SD-07 Certificates														
	Geotextile	2.1.1													
31 11 00	**SD-03 Product Data**														
	Nonsaleable Materials	3.6.1	G												
31 32 11	**SD-01 Preconstruction Submittals**														
	Work sequence schedule	1.7	G												
	Erosion control plan	1.7	G												
	SD-02 Shop Drawings														
	Site Layout	3.2.2													
	[ ]														
	Obstructions Below Ground	3.2.4													
	Erosion Control	3.2.2													
	Seed Establishment Period	2.5.13.1													
	Maintenance Record	3.6													
	SD-03 Product Data														
	Equipment	1.3													
	Finished Grade	3.1.1													
	Erosion Control Blankets	2.5													
	SD-06 Test Reports		G												
	Geosynthetic Binders	2.2.2													
	Hydraulic Mulch														
	Geotextile Fabrics	2.4													
	Erosion Control Blankets	2.5													
	Sand	2.7													

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Gravel	2.7													
	SD-07 Certificates														
	Fill Material														
	Mulch	2.3													
	Hydraulic Mulch														
	Geotextile Fabrics	2.4													
	Geosynthetic Binders	2.2.2													
	Synthetic Soil Binders	2.2.1													
	Installer's Qualification	1.6.1													
	Recycled Plastic	2.1													
	Seed	2.5.13													
	Asphalt Adhesive	2.3.3													
	Tackifier														
	Wood By-Products														
	SD-10 Operation and Maintenance														
	Data														
	Maintenance Instructions	3.6.2													
	SD-11 Closeout Submittals														
	Local/Regional Materials	1.9.1													
	Recycled Plastic	2.1													
	Wood Cellulose Fiber														
	Paper Fiber														
	Mulch Control Netting and Filter Fabric	2.3.4													
	Hydraulic Mulch		G												
	Erosion Control Blankets Type XI	2.5.11													
	Geotextile Fabrics	2.4	G												
	Aggregate	2.7													
32 05 33	**SD-01 Preconstruction Submittals**														
	Intregrated Pest Management Plan	2.3	G												
	SD-07 Certificates														
	Maintenance Inspection Report	3.5.1													
	Plant Quantities	3.5.2	G												
	SD-10 Operation and Maintenance														
	Data														
	Maintenance	1.7													
	SD-11 Closeout Submittals														
	Tree, staking and guying removal	3.5.3													
32 11 16	**SD-03 Product Data**														

EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120
Contract No. N62470-02-D-3260

Project No. 129893
Project Title: SWMU 14 Asphalt Cover - Removal Action

Revision No. 01
Shaw Environmental, Inc.

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Equipment	1.7													
	Waybills and Delivery Tickets	1.3.3													
	SD-06 Test Reports														
	Sampling and Testing	1.5													
	Field Density Tests	1.5.2.4													
32 11 23	**SD-03 Product Data**														
	Plant, Equipment, and Tools	1.7													
	Waybills and Delivery Tickets	1.8													
	SD-06 Test Reports														
	Sampling and Testing	1.5	G												
	Field Density Tests	1.5.2.4	G												
32 11 26.16	**SD-05 Design Data**														
	Job-mix formula	1.6.1													
	SD-06 Test Reports														
	Abrasion test	2.1.1.1													
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EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120 Contract No. N62470-02-D-3260	Project No. 129893 Project Title: SWMU 14 Asphalt Cover - Removal Action	Revision No. 01 Shaw Environmental, Inc.

							Contractor Action			Approving Authority					
Spec. Sect.	SD Number and Submittal Description	Spec Paragraph Number	Approving Authority	Other Reviewers	Transmittal Control No.	Planned Submittal Date	Action Code	Date of Action	Date Forwarded to Appr Auth/ from Contr	Date Forward to Other Reviewer	Date Rcvd from Other Reviewer	Action Code	Date of Action	Date Rcvd from Appr Auth	Remarks
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
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SUBMITTAL REGISTER

Task Order No. 0120 Contract No. N62470-02-D-3260	Project No. 129893 Project Title: SWMU 14 Asphalt Cover - Removal Action	Revision No. 01 Shaw Environmental, Inc.

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
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EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 0120 **Contract No. N62470-02-D-3260**	**Project No. 129893** **Project Title: SWMU 14 Asphalt Cover - Removal Action**	**Revision No. 01** **Shaw Environmental, Inc.**

							Contractor Action			Approving Authority					
Spec. Sect.	SD Number and Submittal Description	Spec Paragraph Number	Approving Authority	Other Reviewers	Transmittal Control No.	Planned Submittal Date	Action Code	Date of Action	Date Forwarded to Appr Auth/ from Contr	Date Forward to Other Reviewer	Date Rcvd from Other Reviewer	Action Code	Date of Action	Date Rcvd from Appr Auth	Remarks
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	SD-04 Samples														
	Mulch	2.4	G												
	SD-06 Test Reports														
	Topsoil composition tests	1.4.1													
	Percolation Test	1.4.5													
	SD-07 Certificates														
	Nursery certifications	1.4.2													
	Nursery certifications	2.1.1													
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33 40 01	**SD-03 Product Data**														
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	Pipe for Culverts and Storm Drains	2.1													
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Notes:
Approved By:
G: Government
Blank: QC Manager
A/E Contractor: A
Reference; QMP-16.2 Submittal Management Process

ACTION CODES
A: Approved
AN: Approved as Noted
NR: Not Reviewed
RR: Disapproved; Revise and Resubmit

EXHIBIT V-2

LIST OF PERSONNEL AUTHORIZED TO REVIEW AND CERTIFY SUBMITTALS Shaw Environmental, Inc. SWMU 14 Asphalt Cover - Removal Action Task Order No. 0120 Naval Station Norfolk, Norfolk, Virginia		
	SUBMITTAL TYPE:	AUTHORIZED PERSONNEL:
Work Plan Submittals	Preconstruction	Project Manager
All Work Plan/ Addendum Sections	All Types	QC Manager, Program QC Manager, Project Manager and Site Engineer

EXHIBIT VII-1

TESTING PLAN AND LOG
Shaw Environmental, Inc.
SWMU 14 Asphalt Cover - Removal Action, Naval Station Norfolk, Norfolk, VA
Task Order No. 0120

CONTRACT NUMBER			PROJECT TITLE: SWMU 14 Aspalt Cover Removal Action								
N62470-02-D-3260			LOCATION: Naval Station Norfolk, Nofolk, VA								
WORK PLAN SECTION OR SPECIFICATION NUMBER	ITEM OF WORK	TEST REQUIRED	ACCREDITED/ APPROVED LAB		SAMPLED BY	TESTED BY	LOCATION OF TEST		DATE COMPLETED	DATE FORWARDED TO CONTR. OFF.	REMARKS
			YES	NO			ON SITE	OFF SITE			
WP 3.3.10 and SAP Appx F	Waste Disposal Characterization Sampling	TCLP VOCs (EPA Method 1311/8260B), TCLP SVOCs (EPA Method 1311/8270C), TCLP Pesticides (EPA Method 1311/8081), PCBs (EPA Method 1311/8082), TCLP herbicides (EPA Method 1311/8151), TCLP Metals (EPA Methods 6010B and 7000), Corrosivity, Ignitibility, and Reactivity (EPA Methods 9045C, 1010/1020, 9010, 9030), TPH DRO (EPA Method 8015M), TPH GRO (EPA Method 8015B), TOX (EPA Method 9023)									One composite sample to be collected for each waste stream
31 00 00	Clean Fill Chemical Analysis	TPH DRO (EPA Method 8015M), TPH GRO (EPA Method 8015B), Corrosivity, Ignitability, and Reactivity (EPA Methods 9045C, 1010/1020, 9010, 9030), VOCs TCL (EPA Method 8260B), SVOCs TCL (EPA Method 8270C), Pesticides (EPA Method 8081), PCBs (EPA Method 8082), Chlorinate Herbicides (EPA Method 8151), Total metals TAL (EPA Method 6010 and 7000), Total Cyanide TAL (EPA Method 9012A)									To be tested once for each source used.

TESTING PLAN AND LOG
Shaw Environmental, Inc.
SWMU 14 Asphalt Cover - Removal Action, Naval Station Norfolk, Norfolk, VA
Task Order No. 0120

WP 3-2 and SAP Appx F	Decon Water Sampling	TPH DRO (EPA Method 8015M), TPH GRO (EPA Method 8015B), Corrosivity, Ignitability, and Reactivity (EPA Methods 9045C, 1010/1020, 9010, 9030), VOCs TCL (EPA Method 8260B), SVOCs TCL (EPA Method 8270C), Pesticides (EPA Method 8081), PCBs (EPA Method 8082), Chlorinate Herbicides (EPA Method 8151), Total metals TAL (EPA Method 6010 and 7000), TOX (EPA Method 9023)									To be tested as necessary
03 30 00.00 20	Cast In Place Concrete	Slump (ASTM C 143), Temperature (ASTM C 1064), Air Content (ASTM C 173 or 231), Unit Weight (ASTM C 567), Compressive Strength (ASTM C 39), and Ion Concentration (ACI 318M)									Test slump, temperature, air content, and unit weight once per 20 cubic yards of concrete placed. Test compressive strength once per 100 cubic yards of concrete placed. Test ion concentration once per mix design.
03 40 00.00 10	Pre-Cast Concrete	Slump (ASTM C 143), Temperature (ASTM C 1064), Air Content (ASTM C 173 or 231), Unit Weight (ASTM C 567), Compressive Strength (ASTM C 39), and Water Tightness.									Test slump, temperature, air content, unit weight and compressive strength once per 150 cubic yards of concrete used. Do vacuum or water test for undergound products.
31 00 00	Earthwork (imported fill / backfill of trenches)	Gradation (ASTM C 136, D422, or D1140), Optimum Moisture Content / Density (ASTM D 1557), In place density (ASTM D 1556, 2167, or 6928), In Place Moisture Content (ASTM D 2216), Displacement of Pipe (visual)									Test gradation and optimum moisture content / density once per 1,000 cubic yards of imported material. Test in place moisture content twice per day of imported fill placement. Test in place density once per 10,000 square feet of placement. Check all pipes / conduit for displacement after backfilling is complete.
31 05 19	Geotextile	QA test per ASTM D 4759									Collect sample and analyze only at the request of the contracting officer.

TESTING PLAN AND LOG
Shaw Environmental, Inc.
SWMU 14 Asphalt Cover - Removal Action, Naval Station Norfolk, Norfolk, VA
Task Order No. 0120

32 11 16	Subbase for paving	Sieve analysis (ASTM C 117 or 136), Liquid Limit / Plasticity Index (ASTM D 4318), Moisture Density (ASTM D 1557), Wear (ASTM C 131), Weight of Slag (ASTM C 29), Field Density (ASTM D 1556, 2497, or 6938), Thickness (3" diameter hole test), and Smoothness									Test seive analysis and liquid limit / plasticity index initially and again for every 1,000 square yards of area. Test Moisture density, wear, and weight of slag initially only. Test field density and thickness once per 500 square yards of area. Test smoothnesss as outlined in section 3.1 of the specification.
32 11 23	Aggregate Base Course	Sieve analysis (ASTM C 117 or 136), Liquid Limit / Plasticity Index (ASTM D 4318), Moisture Density (ASTM D 1557), Wear (ASTM C 131), Soundness (ASTM C 88), Weight of Slag (ASTM C 29), Field Density (ASTM D 1556, 2497, or 6938), Thickness (3" diameter hole test), and Smoothness									Test seive analysis and liquid limit / plasticity index initially and again for every 500 square yards of area. Test Moisture density, wear, soundness, and weight of slag initially only. Test field density and thickness once per 250 square yards of area per lift. Test smoothnesss as outlined in section 3.5.9 of the specification.
32 11 26.16	Asphalt Base Course	Aggregrate - gradation (ASTM C 136), abrasion (ASTM C 131), and stripping (AASHTO T 182); Bituminous Mix - stability and flow (ASTM D 1559); Pavement Course - optimal density (ASTM D 1559), field density (ASTM D 1188 or 2726), thickness, and smoothness.									Run aggregrate tests initially and again with any change in aggregate source. Test bituminous mix once per 500 tons. Test pavement course optimal density once per 1,000 tons. Test pavement course field density and thickness once per 2,000 square yards of area. Test smoothnexx as outlined in paragraph 3.6.2.3.c of the specification.

TESTING PLAN AND LOG
Shaw Environmental, Inc.
SWMU 14 Asphalt Cover - Removal Action, Naval Station Norfolk, Norfolk, VA
Task Order No. 0120

32 12 17	Asphalt Surface Course	Aggregrate - gradation (ASTM C 136), mineral filler (ASTM D 546), and abrasion (ASTM C 131); Bituminous Mix - sieve (ASTM D 2172), stability and flow (ASTM D 1559), and tensile strength ratio (ASTM D 4867); Pavement Course - optimal density (ASTM D 1559), field density (ASTM D 1188 or 2726), thickness, smoothness, finish grade, and finish texture.									Run aggregrate tests initially and again with any change in aggregate source. Run bituminous mix tests once per 500 tons. Test pavement course optimal density once per 1,000 tons. Test pavement course field density and thickness once per 2,000 square yards of area. Test smoothness, finish grade, and finish texture as outlined in paragraphs 3.5.2.3.c, d, and e of the specification.

EXHIBIT VIII-1

REWORK ITEMS LIST
Shaw Environmental, Inc.
SWMU 14 Asphalt Cover - Removal Action
Naval Station Norfolk, Norfolk, Virginia

Contract No. N6247002-D-3260

SWMU 14 Asphalt Cover - Removal Action

Location: Naval Station Norfolk, Norfolk, VA

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

EXHIBIT X-1

QUALITY CONTROL INSPECTION PLAN
Shaw Environmental, Inc.
SWMU 14 Asphalt Cover - Removal Action, Naval Station Norfolk, Norfolk, VA
Task Order No. 0120

Specification Section	Definable Feature of Work	Subtasks	Items of Work to be Verified	Control Check Verification					
				Date	Preparatory Phase Checklist/Report No.	Date	Initial Phase Checklist/Report No.		Follow-up Phase Checklist/Report No.
WP 3.2	**Mobilization, Site Preparation**	Mobilization	Upon receipt, the condition of all equipment, facilities, and materials shall be inspected and documented by the site QC Manager.						
		Utility Markout	Notify Miss Utility at least 48 hours prior to any intrusive activities and update the dig permit ticket as required. Also, have an independant subcontractor also check for underground utilities.						
		E&S Control Installation	Verify installation of controls to prevent erosion and sedimentation, Perform inspections following each runoff producing rainfall event and maintain.						
WP 3.3	**Site Removal and Grading Activities**	Monitoring Well Protection / Modification	Protect and extend wells to final asphalt grade. Verify trafic load rating of cover.						
		Vegetative Layer Removal	Remove vegetative layer for proper disposal						
		Initial Grading Activities	Verify survey of grade stakes and site grades.						
		Regrade area and compact as specified	Grading and compaction is as specified.						
WP 3.3.5	**Installation of permanent drainage controls**	Installation of permanent drainage controls	Correct placement, size, and quantity. Trenches promptly backfilled to prevent filling with groundwater/stormwater. Correctly rated pre-cast manholes and covers. Piping/drop inlet elevations as shown in drawings. Storm drain inlet and outlet protection installed as necessary.						
WP 3.3.6	**Electrical infrastructure installation**	Electrical infrastructure installation	Ensure depth and cover for underground electrical meet specifications. Ensure that pole foundations are as shown in the drawings.						
WP 3.3.7	**Install aggregrate base course materials**	Install aggregrate base course materials	Materials meet design specifications. Lifts to meet grade stakes as installed by project engineer. Compaction tests pass % compaction required.						
WP 3.3.8	**Install Asphalt Cover**	Subcontractor to place asphalt cover	Meets design requirements as shown in drawings and specifications.						
WP 3.3.9	**Installation of Parking Lot Lighting**	Wiring, poles and fixtures to be installed by an electrical subcontractor	Electrical subcontractor is a licensed electrician. All installations per the apporoved specifications, drawings and applicable NFPA and IEEE standards.						
WP 3.3.10	**Transportation and Disposal**	Segregate and characterize waste materials for proper disposal	Waste vegetative layer, debris removed and segregated and either direct loaded into haul trucks or roll-off boxes as appropriate. Decontamination water and spent PPE properly stored in drums, characterized for disposal. Waste streams properly hauled off site and disposed at an approved landfill.						

QUALITY CONTROL INSPECTION PLAN Shaw Environmental, Inc. SWMU 14 Asphalt Cover - Removal Action, Naval Station Norfolk, Norfolk, VA Task Order No. 0120									
WP 3.4	**Site Restoration**								
		Landscaping and vegetation repair	Done in accordance with the project design and applicable construction drawings						
		Parking Lot Striping	Lines as required to identify all parking spaces, entrances, exits, throughways, and traffic patterns in accordance with the design, applicable construction drawings, and Base requirements.						
		Removal of temporary E&S controls	Controls for disturbed areas that have not been stabilized will be left in place and maintained until the area has been satisfactorily stabilized and/or grass is fully established. drainage inlet and outlet protection measures will remain in place for an extended period of time following construction activities.						
		Final As-built Survey	Licensed surveyor to perform a final As-built survey of the site. The final as-built drawing to be included as a hard copy and on CD in the Completion Report.						
WP 3.5	**Site Teardown and Demobilization**	Site teardown and demobilization	Remove personnel, equipment, temporary facilities, and excess materials						

EXHIBIT XI-1

PERSONNEL MATRIX Shaw Environmental, Inc. SWMU 14 Asphalt Cover - Removal Action Task Order No. 0120			
SPECIFICATION SECTION	SUBMITTALS TO BE REVIEWED BY:	THREE PHASE TO BE PERFORMED BY:	TESTING TO BE PERFORMED BY:
All Sections	Site QC Manager, Program QC Manager, Project Manager or Project Engineer	Site QC Manager	Chemical Analysis - TBD

Appendix E

Environmental Protection Plan

ENVIRONMENTAL PROTECTION PLAN
SWMU-14 Asphalt Cover - Removal Action
Naval Station Norfolk
Norfolk, VA

Prepared for:

DEPARTMENT OF THE NAVY
Mid-Atlantic Division
Naval Facilities Engineering Command

Contract No. N62470-02-D-3260
Task Order: 0120

Prepared by:

Shaw Environmental, Inc.
500 E. Main Street, Suite 1630
Norfolk, VA 23510

Reviewed by:

Mark A. Pisarcik
Project Manager

James A. Dunn, Jr. PE
Program Manager

Project No. 129893
May 2008

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List of Acronyms

Acronym	*Title*
CFR	Code of Federal Regulations
E&S	erosion and sediment
EC	Emergency Coordinator
EPP	Environmental Protection Plan
FEAD	Facilities Engineering & Acquisition Department
LEL	Lower Explosive Limit
NTR	Navy Technical Representative
O2	Oxygen
OSHA	Occupational Safety and Health Administration
PCB	Poly-chlorinated biphenyl
PID	Photo-ionization detector
PM	Project Manager
PWD	Public Works Department
RA	Remedial Action
Shaw	Shaw Environmental, Inc.
SSO	Site Safety Officer
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SS	Site Supervisor
SSHSP	Site-Specific Health and Safety Plan
SVOC	Semi-volatile organic compound
SWMU	Solid Waste Management Unit
US	United States
USACE	United States Army Corps of Engineers
VOC	Volatile organic compound

1.0 Introduction

The purpose of this Environmental Protection Plan (EPP) is to present information needed to minimize the hazards to human health and the environment from fires, explosions, spills, or any unplanned or sudden release of pollutants during the remedial activities at Solid Waste Management Unit (SWMU)-14 located within the Naval Station, Norfolk, VA. The remedial activities will be performed under contract N62470-02-D-3260, Delivery Order No. 0120.

This EPP is a part of the Work Plan for Site SWMU-14 and it fulfills the requirements within the contract and the following documents:

- Code of Federal Regulations (CFR):
  - 29 CFR 1910 Subpart G: Occupational Health and Environmental Control
  - 40 CFR 261: Identification and listing of hazardous waste
  - 40 CFR 262: Generators of hazardous waste
  - 40 CFR 263: Transporters of hazardous waste
  - 49 CFR 178: Shipping Container Specification
- U.S. Army Corps of Engineers (USACE)
  - COE EP-1165-2-304: 1976 Flood Plain Regulations for Flood Plain Management.

This EPP is intended for use during the construction phase of the asphalt cover at the site. It establishes guidelines which must be followed by Shaw Environmental, Inc. (Shaw) during activities at the site and must be used in conjunction with the other project plans, project specifications, and design drawings. This EPP particularly goes hand-in-hand with the Site-Specific Health and Safety Plan (SSHSP). Field staff administering health and safety practices will also coordinate and monitor the activities required and associated with this EPP.

1.1 Remedial Activities

Remedial activities at SWMU-14 will include the following:

- Sizing and off-site disposal of concrete and wood debris
- Waste disposal characterization sampling
- Monitoring well abandonment, relocation, modification
- Installation of site drainage features
- Installation of underground electrical conduit and pole foundations
- Installation of fill materials and final site grading
- Installation of aggregate base course
- Placement of asphalt parking lot
- Installation of light poles and fixtures
- Site restoration

2.0 Organization Structure for Implementation

This chapter describes the personnel and required chain of command that will control and direct environmental protection activities.

2.1 Responsible Parties

The US Navy is the owner of the project site and is the responsible party for the remedial activities. The US Navy has contracted Shaw to perform the remedial activities. Throughout the duration of the remedial activities, Shaw will notify the US Navy of any environmental protection incident as soon as possible.

2.1.1 Navy Technical Representative

The Navy Technical Representative (NTR) is responsible for all notifications to local, state, and federal authorities.

2.1.2 PWD FEAD

The US Navy Public Works Department Facilities Engineering and Acquisitions Department (PWD FEAD) representative will oversee Shaw's execution of the EPP.

2.1.3 Shaw

Shaw is responsible for implementing environmental protection procedures and is responsible for all information contained in this document and as described in the SSHSP.

2.2 Emergency Services

A summary of local and state emergency service agencies is listed in the SSHSP. Individual emergency agencies and responsibilities are presented in the sections to follow.

2.2.1 Police

The Naval Station Security Police will provide police support for blocking traffic, and other related duties during environmental protection situations. Unlawful entry into the project site will also be reported to the Security Police.

2.2.2 Fire Department

All environmental protection situations requiring fire department personnel and equipment will be reported to the Naval Station Fire Department.

2.3 Coordination Responsibilities

All environmental protection provisions will be implemented by means of Shaw's organizational structure. Shaw is responsible for coordination, training, drills, and notification to the US Navy, and other aspects of the EPP.

2.3.1 Project Manager

The Project Manager (PM) is ultimately responsible for completion of the project in accordance with the plans. He delegates the authority for the implementation, maintenance, and compliance of the project activities with this document and the SSHSP to the Site Safety Officer (SSO), or Site Supervisor (SS) in the absence of the SSO.

2.3.2 Site Safety Officer

The SSO will be responsible for all environmental health and safety activities and will be responsible for ensuring the implementation of this EPP in the field. These activities will include air monitoring activities, overseeing the decontamination of equipment and clothing, decontamination procedures, environmental protection activities, and emergency response procedures. The SSO will also be responsible for training of on-site personnel as may be necessary. The SSO has the authority to stop any operation that threatens the health and/or safety of the team or surrounding populace. The environmental protection inspections and daily health and safety activities may be conducted by the SSO or the SS. The SS is responsible for assuring that the daily environmental protection is performed.

2.3.3 Site Supervisor

The SS is responsible for field implementation of the environmental procedures and the health and safety program during the course of the work, and takes on a lead role in this when the SSO is not present. This responsibility includes advising site workers of the specific health and safety requirements and consulting with the SSO regarding appropriate changes to the environmental protection section and the health and safety plan.

2.3.4 Emergency Coordinator

The Emergency Coordinator (EC) will implement and coordinate all environmental procedures during spills and releases, or any other emergency situations. During an emergency, the EC will activate alarm systems, notify the FEAD and NTR, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation. The EC will also be responsible for follow-up activities after the incident such as treating, storing, or disposing of residues and impacted soil, decontamination and maintenance of emergency

equipment, and submission of any reports. The EC is also responsible for personnel training and evacuation drills. The SS or the SSO will be the EC, depending who is on site. The EC will be on-site during all remediation operations.

2.3.5 Site Personnel

All personnel will be responsible for working in a safe and healthy manner. They will be required to comply with all applicable local, state and federal rules and regulations, as defined in the SSHSP.

3.0 Materials Inventory Compatibility

This chapter contains information regarding the materials that may be involved in a spill or release.

Table 1 lists quantities of the materials present on-site by their type.

3.1 On-Site Materials

The suspect constituents that potentially could be encountered are various VOCs, SVOCs, PCBs, metals, pesticides, and dioxins/furans. Methane and other volatile gases could be encountered with organic decay, especially if any municipal solid waste is present. On-site materials consist of (but are not limited to): contaminated soil, concrete, wood debris, petroleum products, and waste water.

3.2 Organic Vapor Releases

Organic vapor releases could occur during excavation activities. Organic vapor concentrations in the air during excavation activities will be monitored using air-monitoring equipment such as a photo-ionization detector (PID). Air monitoring requirements are described in the SSHSP.

3.3 Fuel and Flammable Liquid Storage

To complete the project, Shaw will contain on-site fuels and oils for construction vehicles. The types of materials that may be stored at the fuel depot are as follows:

- Diesel fuel
- Gasoline
- Motor transmission oils
- Greases
- Used oil
- Hydraulic fluid.

3.4 Other Materials of Concern

Other materials necessary to complete the project that have the potential for spills and releases are listed below. The exact quantity and type of these materials will be determined during remedial activities:

- Cleaning solvents
- Fertilizer
- Grout
- Bentonite

These materials will be used as cleaning, well abandonment, and landscaping materials during the construction and restoration period.

3.5 Material Compatibility

The materials mentioned in Sections 3.1 to 3.4 are not anticipated to be mixed or combined during site operations, and will be stored in a manner to prevent accidental mixing in the event of a spill/release.

4.0 Emergency and Decontamination Equipment

This chapter presents the types of emergency equipment that will be used in the event of a spill or other emergency situation.

4.1 Small-Scale Emergency Equipment

Small-scale emergency equipment that will be available will include the following:

- Dry chemical, ABC-rated fire extinguishers
- Spill control equipment
- Absorbent materials
- Decontamination equipment
- Air purifying respirators
- Radio and telephone equipment
- Windsock
- Various hand tools.

This equipment will be made accessible to all on-site workers. A list of small equipment is provided in Table 2.

4.2 Large-Scale Emergency Equipment

Large-scale emergency equipment will include the same equipment used in the ongoing construction activities. The equipment may include a dozer, front-end loader, and an excavator. Other emergency equipment may be obtained from rental equipment vendors, the local fire department or other emergency response agencies, if required. A list of large equipment proposed for on-site use is provided in Table 2.

4.3 Decontamination Equipment

Equipment necessary for decontamination activities will be provided, installed, and verified in working order prior to any site operations. Equipment for the decontamination area includes the following items:

- Decontamination pad and sump
- Clean water supply
- Detergent solution
- Pressure washer
- Containers for used decontamination solution and decontamination residues/solids
- Brushes
- Waste containers.

The decontamination pad (decon pad) will be a steel tray with raised wooden tracks and poly side shields. All wash water and sediment will be contained within this structure and drain to an integral 55-gallon drum. A sump pump will be installed in the drum. The pump will discharge through a hose to a poly tank. The platform will be sufficiently reinforced to allow for heavy vehicle ingress and egress from the decon pad.

5.0 Site Evacuation Plan

This chapter provides the procedures to be followed in the event that any of the site needs to be evacuated.

5.1 Site Evacuation Signal

All site personnel, including equipment operators, technicians, and supervisors will evacuate the site upon hearing the evacuation signal. The signal will consist of a continuous blast from an air horn. The blast will be at least 15 seconds in duration, and will be sounded from a location that broadcasts clearly to the entire site. The signal will be repeated at least two times to alert all personnel. A visual signal (clutching the throat with the hands) will also indicate a site evacuation.

5.2 Site Evacuation and Routes

After the evacuation signal is sounded, all personnel will immediately proceed to the meeting point. The meeting point will be established in the site vicinity at the beginning of the job. This area is to be used by personnel working at the site. One supervisory person will proceed to this location. Radio/cell phone contact will be maintained with all management staff. Wind direction will be noted during the evacuation by observing a windsock (to be installed). Every attempt to reach the upwind meeting location must be made by all site personnel. All equipment, trucks, and other internal combustion engines will be shut down prior to personnel evacuation if the equipment can be reached without risking personal safety.

Evacuation routes and meeting points will depend on the current project phase for the site. In general, the most direct route should be made when evacuating to a meeting point.

The EC will contact the FEAD to inform them of the nature and extent of the emergency. A meeting point coordinator will be chosen at the meeting point. This person will generally be the most senior person (e.g., SSO, EC, foreman, or other supervisor) at the location. The meeting point coordinator will follow actions described in Section 5.3.

5.3 Post Evacuation Actions

A head count of personnel assembled at the meeting point will be taken by the meeting point coordinator immediately after the evacuation and provided to the EC. Information regarding missing and/or injured personnel will be brought to the immediate attention of the meeting point coordinator. No personnel will attempt to re-enter the site at this time. The EC or appointed

representative will coordinate activities with the FEAD. After the emergency has been resolved, the EC will indicate when personnel can enter the site and resume work.

5.4 Site Evacuation Drill

All site personnel must be familiar with the evacuation signal and evacuation procedures prior to any site operations. The evacuation plan will be executed during an announced drill within 5 days after earth moving activities have begun at a site. The EC will announce the drill time to all site personnel and will notify the Navy authorities regarding the nature and time of the drill. The drill will include contacting authorities to verify communication procedures.

6.0 Spill Prevention and Response

This chapter discusses the techniques that will be utilized to minimize the potential for spills and will describe the measures that will be implemented in response to a spill.

6.1 Potential Spill Sources and Prevention Practices

The following sections include the detailed Shaw procedures for activities that include containment, collection, and material disposal or reuse.

6.2 Fuel Storage

Fuel tanks used on site will be anchored to the ground, stabilized on skids, or placed on saddles to prevent overturning and rolling. Containers will be placed outside of the maximum turning radius of all vehicles, as well as turnaround or unloading zones. Secondary containment is required for all fuel containers larger than five gallons. Secondary containment will be 110 percent of the aggregate storage volume. All tanks will be placarded with the National Fire Safety system for hazardous material classification and the tanks will be electrically grounded. A Spill Prevention, Control, and Countermeasures Plan (SPCCP), required under 40 CFR 112, will be prepared if total on-site petroleum aboveground storage capacity of a single container is in excess of 660 gallons or the aggregate aboveground storage capacity is greater than 1,320 gallons.

6.3 On-Site Material Transportation

All materials will be transported on and around the site via haul roads. Practices for preventing material spills will include not overfilling trucks, drivers traveling at posted speeds, and having haul roads maintained in good condition. Additional information is provided in the SSHSP.

6.4 Severe Weather

Short-duration, high-intensity rain showers could create unexpected erosion and drainage problems such as slope and containment berm erosion. After such events, all containment devices will be closely inspected for structural and practical integrity. In addition, spillage or leakage will be immediately corrected. Repair to these containment devices will be made as soon as possible or at least before construction continues and will be logged in the supervisor's daily report.

6.5 Protection of Natural Resources

Minimal clearing and grubbing is expected to be required to complete the RA work at Site SWMU-14. All reasonable attempts will be made to minimize landscape defacement beyond the

limits of planned disturbance. This will include the trimming of trees and brush instead of removal, wherever possible. Operation of equipment will be limited to the confines of the work area to minimize the potential for residual damage to landscape features.

Although Shaw will take all reasonable measures to assure no residual damage beyond the limits of the planned disturbance, it is inevitable that some damage will occur. In the event that damage is done to the landscape beyond the limits of disturbance, the affected area or feature will be restored to the satisfaction of the client's representative, as soon as the restoration is deemed practical. Damaged trees and shrubs will be treated in accordance with Base-approved measures by experienced workers. Plant life or trees damaged beyond repair will be cleared and replaced as directed. Vegetation removed as part of the planned clearing will be replaced in accordance with design specifications.

6.5.1 Dust Control and Erosion Protection

Dust control measures will be implemented as described in the Work Pan. Water trucks with sprinkling attachments will be utilized, as necessary, to control dust in the excavation area and haul roads, and during placement of fill material in the construction and excavation area. The water source for the trucks will be approved by the client prior to utilization. Water will be applied in sufficient quantity to prevent creation of dust, but excessive watering that may result in a muddy condition that may be transferred to the haul roads will not be permitted. Determination of the need for dust control will be the responsibility of the Shaw SS, as dictated by changes in site conditions on a continuing basis. Dust monitoring will be performed as described in the SSHSP.

6.5.2 Control Measures

The sections to follow discuss the temporary and permanent erosion control measures that will be installed during cover construction and excavation activities. All control measures will be installed as described in **Appendix G**, Erosion and Sediment Control Plan, and construction drawings C-2 and C-3 provided in **Appendix B of the work plan**.

6.5.2.1 Temporary E&S Control Measures

Temporary E&S control measures will be installed prior to any land disturbance activities and will remain in place until permanent vegetation has been established and/or the asphalt has been placed.

Silt fence will be utilized along the perimeter of the project site at the limits of disturbance as shown on construction drawing C-2 provided in **Appendix B of the work plan**.

6.5.2.2 Permanent Control Measures

Permanent E&S control measures will include vegetation that will be planted following site construction work and prior to the completion of site activities.

6.6 Maintenance

Shaw will be responsible for the proper maintenance of the seeded area until it is sufficiently established.

6.7 Runoff

Runoff from the disturbed project area will either be collected or will pass through E&S control structures.

7.0 Preventive Actions

This chapter discusses the preventive measures that will be utilized to minimize the possibility of a spill or discharge.

7.1 Inspection

Inspections of site area will be performed by the Shaw SS to verify that procedures for proper storage, handling, and transport of materials are being followed. Inspection and monitoring methods will be through visual observation. Monitoring equipment as described in Section 8.0 will be used when necessary. The construction/excavation area will be inspected regularly.

Other areas and items that will be monitored and noted in the site logbook include:

- Evidence of spilled materials along drainage ditches
- Effectiveness of housekeeping practices
- Various shipping and storage containers used throughout the site
- Staging area
- Proper placards and labeling of truck and tank contents.

Inspections of hazardous material containers will be documented in the SSO's Field Activity Daily Log.

7.2 Equipment Maintenance

All construction equipment will be properly maintained to facilitate safe operation. Equipment (especially trucks) will be properly maintained to minimize spillage or leakage that may occur during on-site transport operations. Further preventive maintenance on trucks is described in Section 7.4.2. Maintenance of heavy equipment is performed by the equipment vendor, who will dispose of waste oil. Spill kits will be ready and available during all maintenance activities.

7.3 Calibration of Monitoring Equipment

It is important that all environmental monitoring equipment be calibrated so that accurate readings of potential spilled or leaked materials may be detected upon inspection. Calibration frequency and procedures will be followed as per the manufacturer's recommendations. Shaw will retain calibration records on site.

7.4 Housekeeping Program

Shaw's housekeeping program includes neat and orderly storage of materials and equipment, proper truck and tank placards, prompt removal of spillage, regular refuse pickup and disposal, and maintenance of roads and surfaces.

7.4.1 Small Spillage

Small spills (less than 10 gallons) may include solid materials or liquid materials being mishandled, dumped, leaked, knocked over, etc. Any material spillage will be immediately contained and collected and placed on the drying pad for later disposal. Work will be performed such that exposed source materials remain within the limits of the construction or below the limits of temporarily constructed berms. All spilled liquids will be contained and collected by absorbent materials and the materials taken to the decon pad area. The EC will notify the FEAD in the event of any spill. The spill will be cleaned up in accordance with US Navy and Virginia Department of the Environmental Quality requirements.

7.4.2 Trucking

All hauling vehicles will be maintained in good operating condition. Tires will be properly inflated and will have adequate tread depth as per the tire manufacture's recommendations. Trucks will not be overloaded, since overloaded trucks increase the possibility of material spillage. Truck end gates will be inspected to confirm that they close and seal properly. The tires and undercarriages of all trucks leaving the construction site shall be visually checked by Shaw to minimize the tracking of soil and dust onto the facility's roads. Trucks entering and leaving the site will utilize the stabilized construction entrances, which were designed to minimize tracking of soil onto facility roads. Trucks entering or leaving the site with loads will be tarped to prevent excessive dust. Trucks hauling waste material off site will be inspected and documented prior to leaving the site.

7.4.3 Temporary Vehicle Decontamination Pad

A vehicle decontamination pad will be provided at the site exit to wash materials from vehicle tires. This reduces the amount of material that falls onto adjoining roads, which will be removed as described in Small Spillage Section 7.4.1.

7.4.4 Worker Training

All employees with the potential of exposure to hazardous substances will be required to attend and complete the Occupational Health and Safety Administration (OSHA) 40-hour Health and Safety course (Hazardous Waste Operations and Emergency Response) as per 29 CFR 1910-120.

All site employees requiring 40-hour health and safety training will be current with respect to 8-hour annual refresher training.

A site-specific training program will involve at least one hour of instruction per employee. At a minimum, the training program will ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures and emergency equipment systems including, where applicable:

- Procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment
- Key parameters for automatic cut-off systems
- Communication and alarm procedures
- Response to fires and explosions
- Site evacuation procedures
- Shut-down operation.

In addition, the employee-training program will address other aspects of the environmental protection section, such as preventive maintenance, inspection and monitoring, and housekeeping practices, etc.

Job-specific environmental protection and health and safety instructions will be reviewed before beginning each new phase of work. If conditions require, the SSO or SS will conduct follow-up training related to a change in operations or any other training deemed necessary by the SSO. Shaw will hold daily safety meetings (tailgate safety meetings) at the beginning of each shift to discuss current considerations.

Site evacuation training will be provided as described in Section 5.0 of this Plan.

8.0 Air Monitoring Requirements

This chapter provides information regarding required air monitoring.

Air monitoring will be performed as required in the SSHSP. A PID will be used to provide real-time, semi-quantitative data on total organic vapor concentrations in and around the breathing zone of workers and downwind of activities at the perimeter of the site. This instrument will be calibrated daily and organic vapor concentration will be monitored during site activities.

The SSHSP identifies additional air monitoring instrumentation (i.e., dust monitor, LEL/O2) and requirements. The SSHSP also defines action levels for upgrading employee protection and instituting emergency actions. The air monitoring will determine concentrations of site contaminants within the ambient air and workers' breathing zones. The air monitoring measurements will be compared to OSHA standards, which are the basis for defining the site action levels. The SSO will make the decision regarding equipment upgrades and emergency action based on the air quality measurements.

A windsock will be installed at the site to monitor the wind direction. The wind direction will be noted by the EC and other site personnel so that all personnel are upwind of the situation during site evacuation.

9.0 Earthmoving Activities

This chapter describes earth moving and associated activities planned for the RA at site SWMU-14.

The project activities that require E&S structures for the control of runoff are site preparation, soil excavation, grading, and site restoration activities. Earthmoving activities will be performed in a manner that will minimize the extent of surface area disturbed at any one time. The earthmoving activities are described in the following sections.

9.1 Site Preparation

Construction activities that will promote runoff during site preparation include clearing and grubbing, initial site grading, and temporary road construction.

All site preparation work will be executed such that all runoff generated passes through E&S control structures, permanent or temporary, prior to discharge from the site.

9.2 Soil Excavation

Soil excavation work may involve clearing and grubbing, construction of a temporary access roads, and removal and disposal of soil from the site. Silt fencing will be installed to control runoff and prevent migration of soil out of the work area. The silt fencing will remain in place until the site is re-vegetated. Excavation and handling of potentially contaminated soils will include “wetting the material” or other methods to mitigate fugitive dust emissions.

9.3 Soil Placement

Soil grading and placement work will be performed to meet design requirements. At a minimum, prior to earthmoving activities, silt fence will be installed on the down-slope side of the excavation area. Additionally, as soil is placed and graded, it will be graded such that all runoff passes through E&S control structures. Any E&S control structure that is installed/constructed during soil placement activities will remain in place until cover installation activities are complete and the site is restored.

TABLES

Table 1

Material Inventory
Site SWMU-14
Naval Station, Norfolk, Virginia

Material	Unit	Quantity	Location	Hazard Class
Impacted debris	Tons	I	SWMU-14	N/A
Diesel Fuel [(A)]	Gallons	I	SWMU-14	Combustible
Gasoline	Gallons	I	SWMU-14	Flammable
Wastewater	Gallons	I	SWMU-14	N/A
Bentonite	Pounds	I	SWMU-14	N/A
Grout	Pounds	I	SWMU-14	Corrosive

Key:

[(A)] Includes motor transmission oils, greases, used oil, hydraulic fluid.

I Ongoing activity. Quantities to be determined during construction activities.

Table 2

Equipment List
Site SWMU-14
Naval Station, Norfolk, Virginia

Equipment	Use	Location
Large Equipment: Dozer Excavator	General material transportation, Clearing/excavation, and grading	On site during work activities
Water tank truck	Moisture/dust control	
Small Equipment: Absorbent materials	Spill prevention	Support & lay-down area
Camera/photo equipment	Project records	Support trailer
Decontamination equipment with a clean water supply (70-80°F)	Equipment decon	On site during work activities
First-aid supplies	Health and safety	Support trailer
ABC-rated portable fire extinguishers [(A)]	Safety; fire control	In each vehicle, support trailer, and lay-down area.
2-way radio/cell phones	Communication	Supervisory personnel
Submersible pumps	Dewatering/decon	On site during work activities

Key:

[(A)] ABC-rated portable fire extinguishers to include one 10-pound unit in each piece of mobile equipment, and one 20-pound unit at each major mechanical operation.

Appendix F

Field Sampling and Analysis Plan

FIELD SAMPLING & ANALYSIS PLAN
SWMU-14 Asphalt Cover - Removal Action
Naval Station Norfolk
Norfolk, VA

Prepared for:

DEPARTMENT OF THE NAVY
Mid-Atlantic Division
Naval Facilities Engineering Command

Contract No. N62470-02-D-3260
Task Order: 0120

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May 2008

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List of Acronyms

Acronym	Title
ASTM	American Society for Testing and Materials
°C	degrees Celsius
COC	chain-of-custody
EPA	United States Environmental Protection Agency
FSAP	Field Sampling and Analysis Plan
LEL/O_2/HS	lower explosive limits/oxygen/hydrogen sulfide meter
PCB	polychlorinated biphenyls
PID	photoionization detector
QC	quality control
Shaw	Shaw Environmental, Inc.
SVOC	semivolatile organic compounds
SSHSP	Site-Specific Health and Safety Plan
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TAT	turn around time
TCL	Target Compound List
TCLP	Toxicity characteristic leaching procedure
TOX	total organic halides
TPH	total petroleum hydrocarbons
VOC	volatile organic compounds

1.0 Introduction

This Field Sampling and Analysis Plan (FSAP) has been prepared to support the planned remediation at the Solid Waste Management Unit (SWMU)-14 at Naval Station, Norfolk, VA. It provides the detailed field sampling procedures to be followed during the removal activities at the site, including specific tasks, such as, waste characterization sampling and clean fill sampling. The removal action task includes placing an asphalt cover (parking lot) and all associated stormwater drainage features. These tasks are discussed in detail in the Work Plan to which this FSAP is an appendix.

Other documents supporting this FSAP are the site-specific Health and Safety Plan (**Appendix C**) and the Construction Quality Control Plan (**Appendix D**).

2.0 Sampling and Analysis

The following sections describe the protocols for sample preparation and collection, field work monitoring, and daily record keeping during the field work activities.

2.1 General Procedures

This section provides general procedures that will be implemented prior to and during sampling, including calibration of field equipment, air monitoring, and collection of the required number of samples, including field quality control (QC) samples.

Air Monitoring

During remedial activities, air monitoring will be conducted as necessary using a photo-ionization detector (PID), lower explosive limits/oxygen/hydrogen sulfide meter (LEL/O_2/H_2S), and a data RAM dust monitor. Field calibration of these instruments will be performed by Shaw Environmental, Inc. (Shaw) personnel prior to use for air monitoring. Field calibration of the PID will consist of a battery check and concentration reading against a laboratory-prepared compressed gas sample of purified air and 100 parts per million isobutylene. The LEL/O_2/ H_2S field calibration will also consist of a battery check and concentration reading against a laboratory-prepared compressed gas sample of a multigas mixture containing methane, oxygen, and hydrogen sulfide.

Air monitoring procedures are detailed in the Site-Specific Health and Safety Plan (SSHSP) (**Appendix C**) and generally include the following:

- Air monitoring near the breathing zone and near workers during excavation and grading activities.
- Air monitoring at the site perimeters during excavation and grading activities.

Refer to the SSHSP for the appropriate levels of PPE.

QC Sampling

The QC sampling procedures are as follows:

- Field duplicate: Collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner for storage, transportation, and analysis.

- Rinsate: Consists of American Society for Testing and Materials (ASTM) Type II reagent water or organic-free water poured into the sampling device, collected in the sampling bottle, and transported to the laboratory for analysis.

- Matrix spike/matrix spike duplicate: At the laboratory, a solution of target analytes at known concentrations that are spiked into a field sample before sample preparation and analysis. The frequency for matrix spike analysis is 5 percent of samples analyzed for each method where spikes are performed.

- Trip blank: A laboratory-prepared sample of organic-free water that is placed in a sample bottle in an uncontaminated area prior to going to the field. Trip blanks will accompany each shipment or cooler of water samples sent to the laboratory for volatile organic compounds (VOC) analysis.

- Split sample: As directed by the Navy, split samples may be taken during the sampling operation to provide a quality assurance check on the laboratory analytical results. All composite samples will be thoroughly mixed to homogenize the sample before removing the split. Samples collected for VOC analysis will not be split, but an identical sample will be collected simultaneously from the same sample location as the first.

The sampling procedures for each of the sites are presented in the following sections. These sections describe the details of the sampling activities that will be conducted during remedial efforts.

2.2 Sampling Procedures

Planned removal activities for Site SWMU-14 include grading and excavation activities in preparation for installation of an asphalt cover (parking lot). Material and sampling requirements for these tasks are discussed in the following sections.

2.2.1 Waste Characterization Sampling

Prior to construction of the asphalt cover approximately 3500 cubic yards of the existing vegetative sod is to be removed from the surface of the area and hauled off site to an approved off-site location. The vegetative sod (assumed to be nonhazardous waste) will be loaded into disposal trucks and transported off-site to an approved Subtitle D landfill. Shaw will perform waste characterization sampling and obtain approval from the disposal facility prior to the start of construction activities. Seven (7) composite waste characterization samples will be collected and analyzed for offsite disposal. If the waste is characterized as hazardous, the Navy will be informed, and the waste will be approved for disposal at an appropriate hazardous waste disposal facility. Section 3.0 lists the specific parameters for waste characterization sampling.

Other waste streams generated or uncovered during construction activities such as decon water, wood debris, or other landfill debris will be containerized and sampled for waste characterization as necessary.

2.2.2 Clean Fill Sampling

Clean fill will be obtained from an off-site borrow source as needed to fill in low spots to achieve elevations of the approved grading plan. Screened top soil may also be used during site restoration activities. One sample from each borrow source will be collected for "clean" certification.

3.0 Sampling Analytical Programs

3.1 Analytical Program

Samples will be sent to the laboratory for the following analyses:

Chemical Analysis (clean fill/topsoil borrow source assessment):

- Total Petroleum Hydrocarbons (TPH) diesel range organics (EPA Method 8015M)
- TPH gasoline range organics (EPA Method 8015B)
- Corrosivity (pH) (EPA Method 9045C)
- Ignitability (EPA Method 1010/1020)
- Reactive cyanide (EPA Method 9010)
- Reactive sulfide (EPA Method 9030)
- VOCs Target Compound List (TCL) (EPA Method 8260B)
- Semivolatile Organic Compounds (SVOC) (TCL) (EPA Method 8270C)
- Organochlorine pesticides (EPA Method 8081)
- Polychlorinated biphenyls (PCB) (EPA Method 8082)
- Chlorinated herbicides (EPA Method 8151)
- Total metals Target Analyte List (TAL) (EPA Methods 6010 and 7000)
- Total cyanide (TAL) (EPA Method 9012A).

Chemical Analysis (disposal characterization for contaminated solids):

- Toxicity characteristic leaching procedure (TCLP) VOCs (EPA Method 1311/8260B)
- TCLP SVOCs (EPA Method 1311/8270C)
- TCLP pesticides (EPA Method 1311/8081)
- PCBs (EPA Method 1311/8082)
- TCLP herbicides (EPA Method 1311/8151)
- TCLP metals (EPA Methods 6010B and 7000)
- Corrosivity (pH) (EPA Method 9045C)
- Ignitability (EPA Method 1010/1020)
- Reactive cyanide (EPA Method 9010)
- Reactive sulfide (EPA Method 9030)
- Total Petroleum Hydrocarbons (TPH) diesel range organics (EPA Method 8015M)
- TPH gasoline range organics (EPA Method 8015B)
- Total organic halides (TOX) (EPA Method 9023).

Chemical Analysis (disposal characterization for decontamination water):

- Total Petroleum Hydrocarbons (TPH) diesel range organics (EPA Method 8015M)
- TPH gasoline range organics (EPA Method 8015B)

- VOCs (TCL) (EPA Method 8260B)
- SVOCs (TCL) (EPA Method 8270C)
- Organochlorine pesticides (EPA Method 8081)
- PCBs (EPA Method 8082)
- Chlorinated herbicides (EPA Method 8151)
- Total metals (TAL) (EPA Methods 6010 and 7000)
- Corrosivity (pH) (EPA Method 9045C)
- Ignitability (EPA Method 1010/1020)
- Reactive cyanide (EPA Method 9010)
- Reactive sulfide (EPA Method 9030)
- TOX (EPA Method 9023).

The soil and water samples for chemical analysis will be sent to an approved laboratory as identified in the QC Plan (Appendix D).

3.2 Sampling Program

Proper sampling protocol will be followed when collecting samples for analysis. As each sample is collected in the field, it will be placed in appropriately labeled containers, and stored in an iced cooler. Sample preparation will include properly labeling the containers and storing the analytical samples at approximately 4 degrees Celsius (°C). Sampling containers will be supplied and prepared by the laboratory according to sample type. Samples that will be shipped to the laboratory for analysis will be prepared for shipment using the following procedures:

- Soil samples designated for chemical parameters will be collected in glass jars.
- Water samples will be collected in the appropriate glass or plastic containers with the proper preservative, when required.
- Pad the bottom of a waterproof cooler with about 3 inches of packing material.
- Place sample containers in waterproof bags to ensure they do not contact water generated from melting ice.
- Use adequate ice sealed in plastic bags (double bagged) to keep the samples and cooler at approximately 4°C.
- Fill cooler with packing material.
- Close cooler and secure the lid by taping the cooler completely around with strapping tape at two locations.
- Indicate the laboratory's address on top of the cooler.

- Affix custody seals on the front right and back left of the cooler; cover seals with wide clear tape.

- Express ship samples to laboratory.

While awaiting packaging, chemical testing samples will be stored on ice in coolers. If required, the samples will be preserved at the time of sample collection.

3.2.1 Chain of Custody

Formal documentation of sampling information will be prepared prior to shipment and is referred to as "chain-of-custody" (COC). Field preparation of the COC form will be as follows:

- The COC will indicate the project name, sampling team, sample description, requested analyses, laboratory destination, special instructions, and possible sample hazards.

- The person delivering the samples for shipment shall sign the COC as Relinquished By (Shaw sampling team member). Received by (appropriate laboratory analyst) will be completed by the laboratory.

- If the samples are shipped to the laboratory by commercial carrier, the original COC record will be sealed in a watertight bag and placed in the shipping container. The shipping container will be sealed prior to being given to the carrier. A copy of the forms will be kept in the project files.

3.2.2 Sample Identification

A sample identification scheme will be employed to identify samples as unique samples collected from specific points. In addition, a unique data management number (i.e., DM-xxxx, where x is equal to the consecutive number in the sampling sequence) will be assigned to each sample.

The unique sample identification number will signify location and type of sampling using designations that include: site identification, type of sample, or supplier name (borrow materials), and sample number. The following provides example sample identification numbers for sample types that will be collected in association with the SWMU-14 remedial action:

- 129893-WC-001 ←Project Number-Waste Characterization-Soil/ Sample Number 1

- 129893-SB-CF01 ←Project Number-Sandy Bottoms borrow pit-clean fill/ Sample Number 1

- 129893-WC-DW01 ←Project Number-Waste Characterization-Decontamination Water Sample Number 1

3.2.3 Sample Shipment

After the samples have been packaged for shipping, the coolers will be delivered to the laboratory via overnight courier. Upon shipment of the samples, each laboratory will be notified that a sample shipment is scheduled to arrive.

3.2.4 Sample Receiving

Following receipt of the samples, the laboratory will inspect and verify the samples and complete a "Cooler Receipt Form" as to the number and condition of samples shipped.

The laboratory will use the sample identification label number and will assign a unique laboratory number to each sample. The sample analysis data will be recorded on the laboratory report form.

When the sample analyses and necessary QC checks have been completed in the laboratory, the unused portions of the samples will be disposed of by the laboratory. Identifying stickers, data sheets, and laboratory records will be retained as part of the permanent documentation.

3.2.5 Daily Record Keeping

Shaw's field personnel will keep daily records to document completed work, and any nonconformance to the work plan based on field conditions. To accomplish this task, the following forms will be completed on a daily basis:

- Sample Collection Log
- Field Activity Daily Log
- Field Instrument Calibration Log
- COC Log.

Completed forms will be summarized and included within the final report.

4.0 Equipment Decontamination and Waste Handling

Unless disposable sampling equipment is used, sampling equipment will be decontaminated prior to collecting each sample. The sampling equipment will be washed with tap water and non-phosphate detergent solution and final-rinsed with distilled water before being used to collect the next sample. Cross contamination will be avoided during sample collection by requiring the sampler to don new, clean latex and/or sterile gloves prior to securing each sample and water mixture.

Rinsate samples will be collected from a decontaminated sampling device that was used during field sample collection. ASTM reagent water or organic-free water will be poured into the sampling device, collected in the sampling bottle, and transported to the laboratory. Rinsate samples will be analyzed for the parameters identified in Chapter 3.0.

All waste water generated from decontamination activities will be properly contained, stored in drums, characterized, and shipped to an approved off-site disposal facility.

Appendix G

Erosion and Sediment Control Plan

Erosion & Sediment Control Plan
SWMU-14 Asphalt Cover - Removal Action
Naval Station Norfolk
Norfolk, VA

Prepared for:

DEPARTMENT OF THE NAVY
Mid-Atlantic Division
Naval Facilities Engineering Command

Contract No. N62470-02-D-3260
Task Order: 0120

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Project No. 129893
May 2008

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List of Acronyms

Acronym	***Title***
E&S	Erosion and Sediment
EPP	Environmental Protection Plan
ESCP	Erosion and Sediment Control Plan
QC	Quality Control
SAA	Satellite Accumulation Area
SWMU	Solid Waste Management Unit
VESCH	Virginia Erosion and Sedimentation Control Handbook

1.0 Introduction

This erosion and sediment control plan (ESCP) describes the erosion and sediment control measures that will be implemented at Solid Waste Management Unit (SWMU)-14 to limit the migration of soil and sediment from disturbed areas. Erosion and sediment control devices and procedures will be in accordance with the "Virginia Erosion and Sedimentation Control Handbook" (VESCH), Virginia Department of Conservation and Recreation, 1992. Measures to address Storm Water Pollution Prevention are discussed throughout this Erosion and Sediment Control Plan and the Environmental Protection Plan (EPP) (**Appendix E**).

Other documents supporting this ESCP are the EPP and the construction drawings in **Appendix B**.

Earth-disturbing activities are as follows:

- Clearing and grubbing of vegetation, expected to be minimal
- Removal of the Q-50 Satellite Accumulation Area (SAA) concrete pad
- Excavation for the bio-retention areas, storm piping, and underground electrical installation
- Soil and sub-grade material grading activities

Proposed erosion and sediment control measures are as follows:

- Dust suppression via water spraying
- Silt fencing
- Bio-socks/tubes
- Poly-sheeting to cover materials
- Sediment traps
- Diversion dikes
- Decontamination pad
- Construction entrances
- Hydro-seeding
- Stabilization and matting blankets
- Storm drain inlet protection
- Rip-rap outlet protection

VESCH standards and specifications that may be applicable to this project and/or are mentioned above are included at the end of this appendix for reference.

2.0 Implementation

The following section describes the implementation procedures that will be followed at the site throughout the life of the project.

2.1 Installation

Prior to commencement of construction activities, the necessary Phase-I erosion and sediment (E&S) control measures will be installed as appropriate. All controls will be installed per the attached standards and specifications of the VESCH. Construction activities will not commence until all necessary Phase-1 controls are correctly installed as approved by the site QC representative. Phase-I controls may include construction entrances, a decontamination pad, silt fence, sediment traps, and diversion dikes.

As construction activities progress in phased sections, Phase-II E&S controls will be implemented as appropriate. These controls may include storm drain inlet and outlet protection and conversion of temporary controls to permanent controls (i.e. sediment traps to bio-retention areas).

Refer to the Phase I and II Erosion and Sediment Control Plan drawings in **Appendix B** for further details.

2.2 Inspections

Inspections of E&S Controls will be conducted on a regular basis. Visual inspections will be conducted daily. Recorded inspections will be conducted weekly and within 48 hrs prior to and following a significant precipitation event. Any identified deficiencies will be corrected as soon as reasonably possible. An inspection log will be maintained at the site by the QC Manager.

2.3 Maintenance

E&S controls will be maintained regularly and as needed. Identified repair needs will be addressed in a timely manner and additional controls will be implemented as necessary throughout the life of the project.

2.4 Removal

Following the completion of site construction activities, the site E&S Controls will be removed as appropriate. Controls will remain in place for areas where vegetation has not yet fully established or areas of unstabilized soil. Shaw will continue to maintain these controls until vegetation is fully established and/or the ground surface has sufficiently stabilized.

3.0 VESCH Standards and Specifications

- Silt fencing
- Temporary stone construction entrance
- Safety fencing
- Construction road stabilization
- Straw bale barriers
- Temporary diversion dikes
- Storm drain inlet protection
- Sediment traps
- Dust control
- Rip-rap placement
- Temporary seeding
- Soil stabilization blankets & matting
- Permanent seeding

Silt Fencing

STD & SPEC 3.05

SILT FENCE

SF

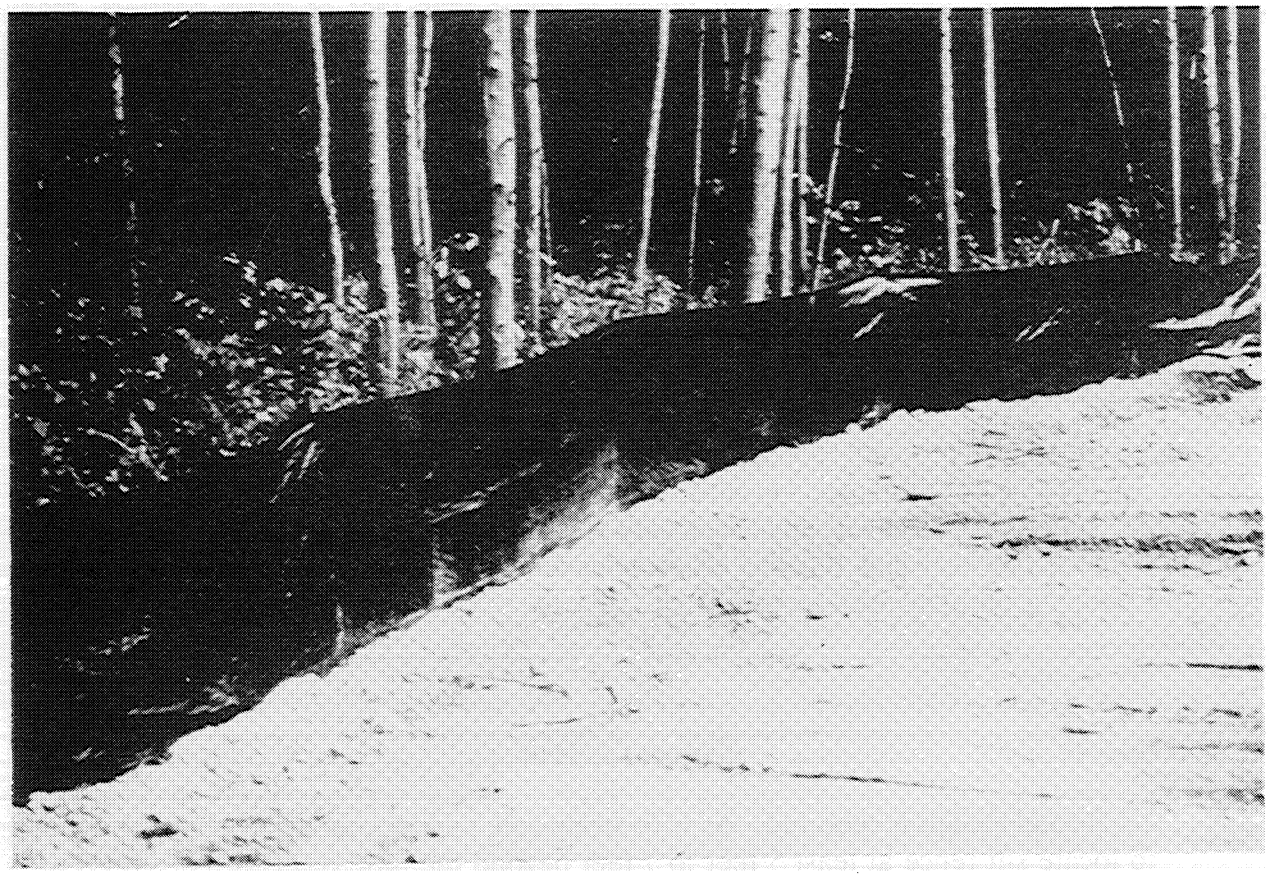
Definition

A temporary sediment barrier consisting of a synthetic filter fabric stretched across and attached to supporting posts and entrenched.

Purposes

1. To intercept and detain small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site.

2. To decrease the velocity of sheet flows and low-to-moderate level channel flows.



Conditions Where Practice Applies

1. Below disturbed areas where erosion would occur in the form of sheet and rill erosion.

2. Where the size of the drainage area is no more than one quarter acre per 100 feet of silt fence length; the maximum slope length behind the barrier is 100 feet; and the maximum gradient behind the barrier is 50 percent (2:1).

3. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 1 acre and flow is no greater than 1 cfs.

4. Silt fence will not be used in areas where rock or some other hard surface prevents the full and uniform depth anchoring of the barrier.

Planning Considerations

Laboratory work at the Virginia Highway and Transportation Research Council (VHTRC) has shown that silt fences can trap a much higher percentage of suspended sediments than straw bales, though silt fence passes the sediment-laden water slower. Silt fences are preferable to straw barriers in many cases because of their durability and potential cost savings. While the failure rate of silt fences is lower than that of straw barriers, many instances have been observed where silt fences are improperly installed, inviting failure and sediment loss. The installation methods outlined here can improve performance and reduce failures.

As noted, flow rate through silt fence is significantly lower than the flow rate for straw bale barriers. This creates more ponding and hence more time for sediment to fall out. Table 3.05-A demonstrates these relationships.

Both woven and non-woven synthetic fabrics are commercially available. The woven fabrics generally display higher strength than the non-woven fabrics and, in most cases, do not require any additional reinforcement. When tested under acid and alkaline water conditions, most of the woven fabrics increase in strength, while the reactions of non-woven fabrics to these conditions are variable. The same is true of testing under extensive ultraviolet radiation. Permeability rates vary regardless of fabric type. While all of the fabrics demonstrate very high filtering efficiencies for sandy sediments, there is considerable variation among both woven and non-woven fabrics when filtering the finer silt and clay particles.

Design Criteria

1. No formal design is required. As with straw bale barriers, an effort should be made to locate silt fence at least 5 feet to 7 feet beyond the base of disturbed slopes with grades greater than 7%.

TABLE 3.05-A

TYPICAL FLOW RATES AND FILTERING EFFICIENCIES OF PERIMETER CONTROL

Material	Flow Rate (gal./sq.ft./min)	Filter Efficiency(%)
Straw	5.6	67
Synthetic Fabric	0.3	97

Source: VHTRC

2. The use of silt fences, because they have such a low permeability, is limited to situations in which only sheet or overland flows are expected and where concentrated flows originate from drainage areas of 1 acre or less.

3. Field experience has demonstrated that, in many instances, silt fence is installed too short (less than 16 inches above ground elevation). The short fence is subject to breaching during even small storm events and will require maintenance "clean outs" more often. Properly supported silt fence which stands 24 to 34 inches above the existing grade tends to promote more effective sediment control.

Construction Specifications

Materials

1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier as conforming to the requirements noted in Table 3.05-B.

2. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0° F to 120° F.

3. If wooden stakes are utilized for silt fence construction, they must have a diameter of 2 inches when oak is used and 4 inches when pine is used. Wooden stakes must have a minimum length of 5 feet.

TABLE 3.05-B

PHYSICAL PROPERTIES OF FILTER FABRIC IN SILT FENCE

Physical Property	Test	Requirements
Filtering Efficiency	ASTM 5141	75% (minimum)
Tensile Strength at 20% (max.) Elongation*	VTM-52	Extra Strength - 50 lbs./linear inch (minimum) Standard Strength - 30 lbs./linear inch (minimum)
Flow Rate	ASTM 5141	0.2 gal./sq.ft./ minute (minimum)
Ultraviolet Radiation Stability %	ASTM-G-26	90% (minimum)

* Requirements reduced by 50% after six months of installation.

Source: VHTRC

4. If steel posts (standard "U" or "T" section) are utilized for silt fence construction, they must have a minimum weight of 1.33 pounds per linear foot and shall have a minimum length of 5 feet.

5. Wire fence reinforcement for silt fences using standard-strength filter cloth shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches.

Installation

1. The height of a silt fence shall be a minimum of 16 inches above the original ground surface and shall not exceed 34 inches above ground elevation.

2. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.

3. A trench shall be excavated approximately 4-inches wide and 4-inches deep on the upslope side of the proposed location of the measure.

4. When wire support is used, standard-strength filter cloth may be used. Posts for this type of installation shall be placed a maximum of 10-feet apart (see Plate 3.05-1). The wire mesh fence must be fastened securely to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of two inches and shall not extend more than 34 inches above the original ground surface. The standard-strength fabric shall be stapled or wired to the wire fence, and 8 inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees.

5. When wire support is not used, extra-strength filter cloth shall be used. Posts for this type of fabric shall be placed a maximum of 6-feet apart (see Plate 3.05-2). The filter fabric shall be fastened securely to the upslope side of the posts using one inch long (minimum) heavy-duty wire staples or tie wires and eight inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees. This method of installation has been found to be more commonplace than #4.

6. If a silt fence is to be constructed across a ditch line or swale, the measure must be of sufficient length to eliminate endflow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope (see Plate 3.05-2). Extra-strength filter fabric shall be used for this application with a maximum 3-foot spacing of posts.

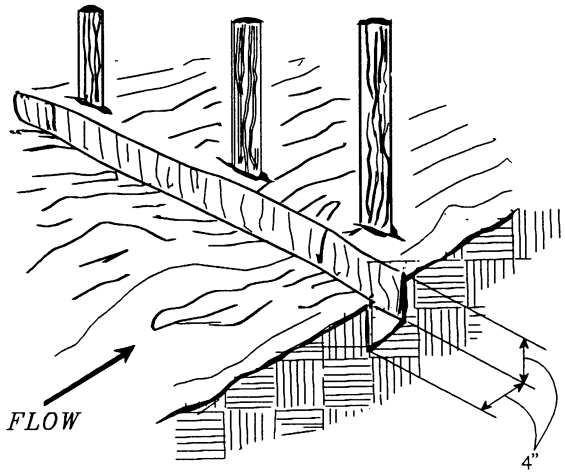
   All other installation requirements noted in #5 apply.

7. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric.

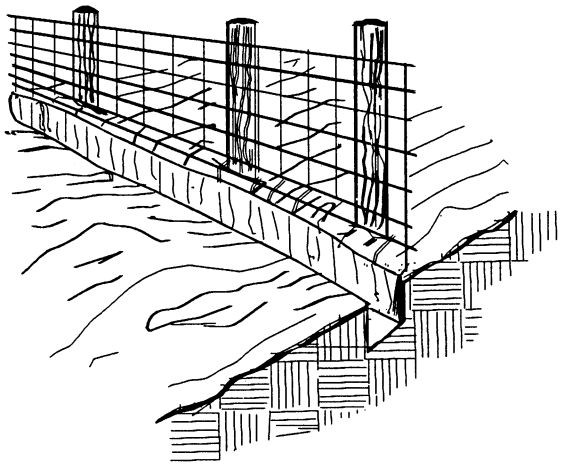
8. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)

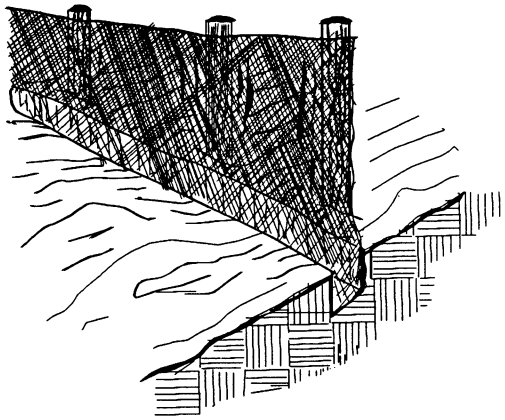
1. SET POSTS AND EXCAVATE A 4"X4" TRENCH UPSLOPE ALONG THE LINE OF POSTS.



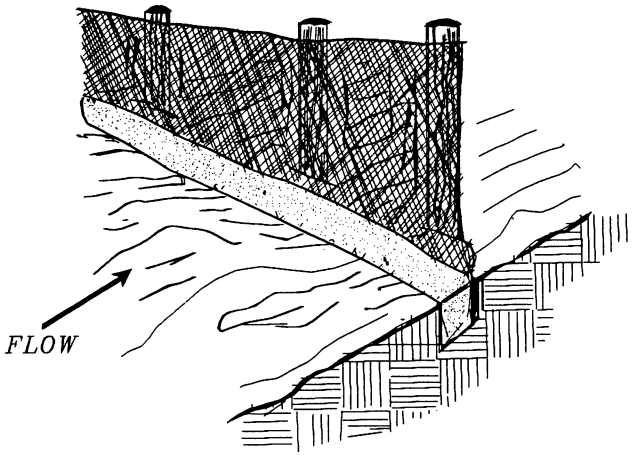
2. STAPLE WIRE FENCING TO THE POSTS.



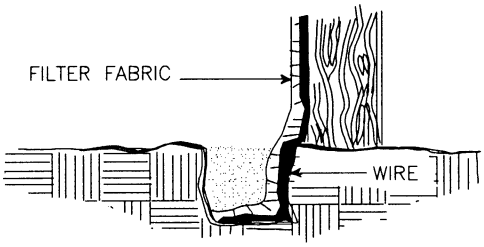
3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



EXTENSION OF FABRIC AND WIRE INTO THE TRENCH.

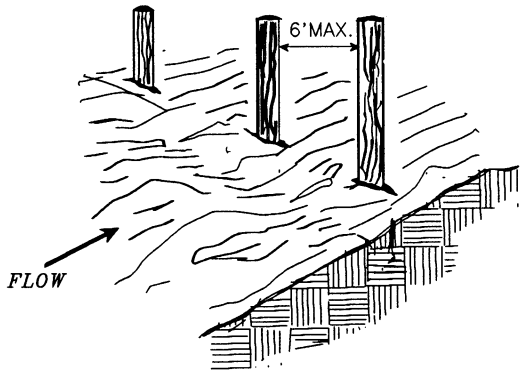


Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

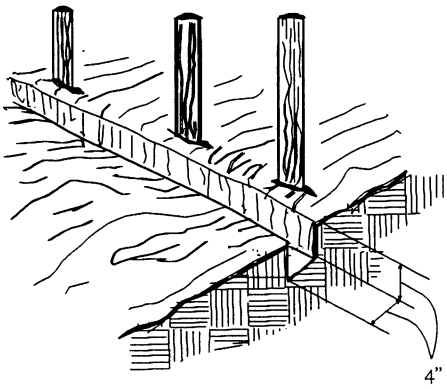
Plate 3.05-1

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

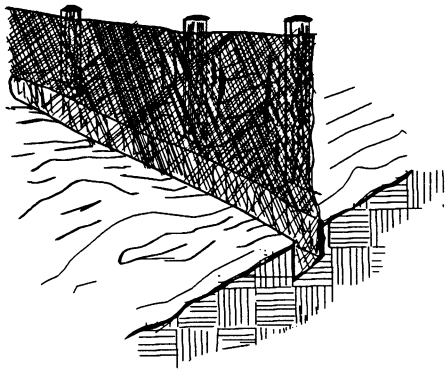
1. SET THE STAKES.



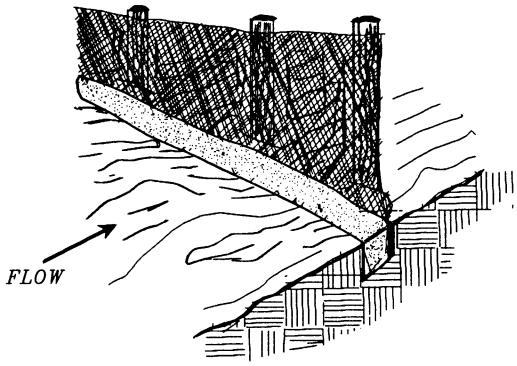
2. EXCAVATE A 4"X 4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.



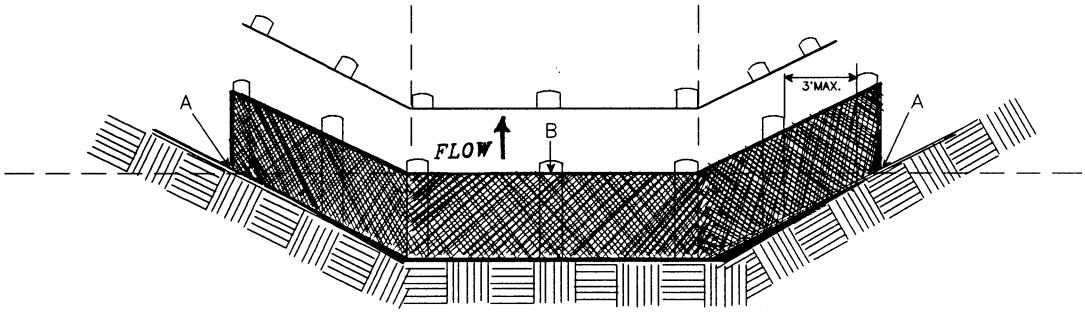
3. STAPLE FILTER MATERIAL TO STAKES AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)



POINTS A SHOULD BE HIGHER THAN POINT B.

DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)

Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-2

Maintenance

1. Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

2. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting.

3. Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.

4. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

5. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared and seeded.

Temporary Stone Construction Entrance

STD & SPEC 3.02

TEMPORARY STONE CONSTRUCTION ENTRANCE

CE

Definition

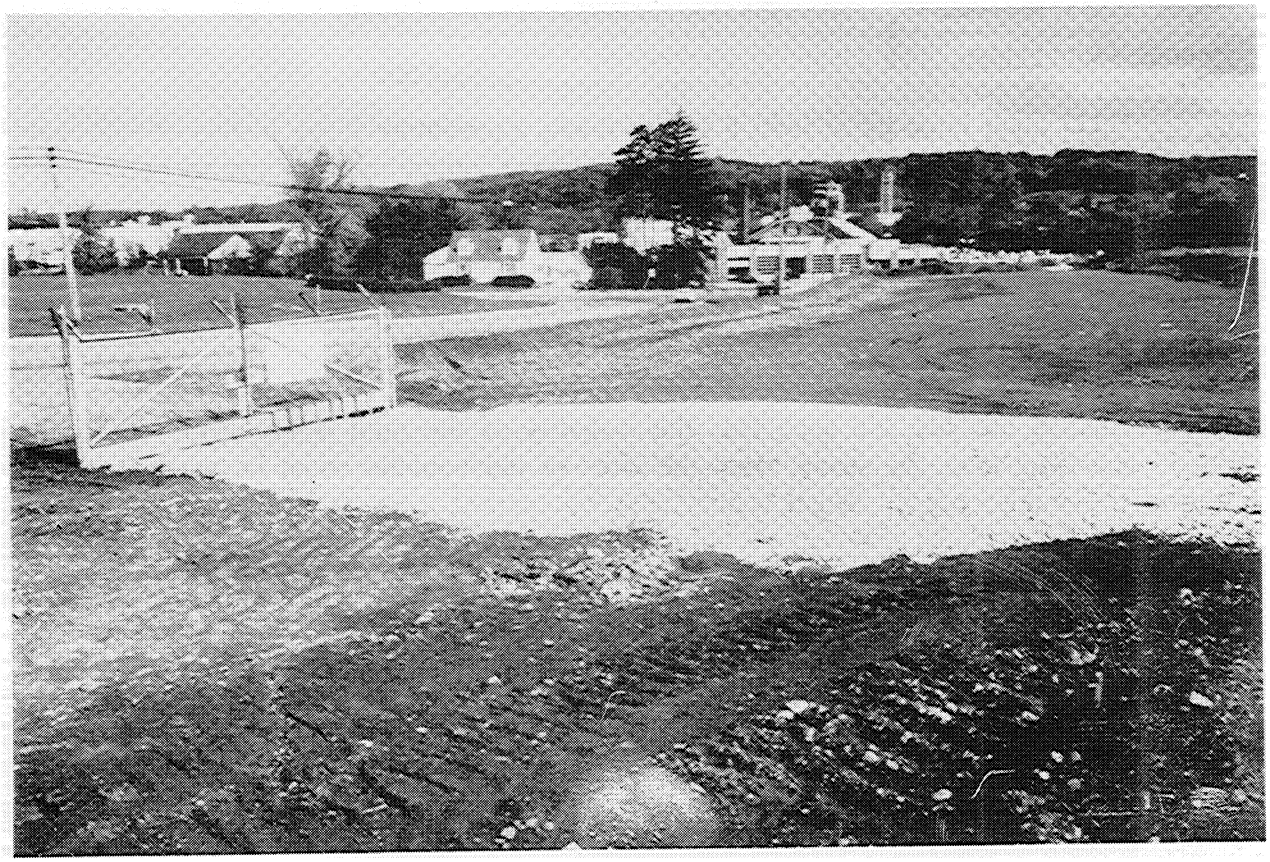
A stabilized stone pad with a filter fabric underliner located at points of vehicular ingress and egress on a construction site.

Purpose

To reduce the amount of mud transported onto paved public roads by motor vehicles or runoff.

Conditions Where Practice Applies

Wherever traffic will be leaving a construction site and move directly onto a public road or other paved area.



Planning Considerations

Minimum Standard #17 (MS #17) requires that provisions be made to minimize the transport of sediment by vehicular traffic onto a paved surface. Construction entrances provide an area where a significant amount of mud can be removed from construction vehicle tires before they enter a public road and, just as important, the soil adjacent to the paved surface can be kept intact. A filter fabric liner is used as a "separator" to minimize the dissipation of aggregate into the underlying soil due to construction traffic loads. If the action of the vehicles traveling over the gravel pad is not sufficient to remove the majority of the mud or there exists an especially sensitive traffic situation on the adjacent paved road, the tires must be washed before the vehicle enters the public road. If washing is necessary, provisions must be made to intercept the wash water and trap the sediment so it can be collected and stabilized. Construction entrances should be used in conjunction with the stabilization of construction roads (see Std. & Spec. 3.03, CONSTRUCTION ROAD STABILIZATION) to reduce the amount of mud picked up by construction vehicles and to do a better job of mud removal. Other innovative techniques for accomplishing the same purpose (such as a bituminous entrance) can be utilized, but only after specific plans and details are submitted to and approved by the appropriate Plan-Approving Authority.

Design Criteria

Aggregate Size

VDOT #1 Coarse Aggregate (2- to 3-inch stone) should be used.

Entrance Dimensions

The aggregate layer must be at least 6 inches thick; a minimum three inches of aggregate should be placed in a cut section to give the entrance added stability and to help secure filter cloth separator. It must extend the full width of the vehicular ingress and egress area and have a minimum 12-foot width. The length of the entrance must be at least 70 feet (see Plate 3.02-1).

Washing

If conditions on the site are such that the majority of the mud is not removed by the vehicles traveling over the stone, then the tires of the vehicles must be washed before entering the public road. Wash water must be carried away from the entrance to a approved settling area to remove sediment. All sediment shall be prevented from entering storm drains, ditches, or watercourses. A wash rack may also be used to make washing more convenient and effective (see Plate 3.02-1).

Location

The entrance should be located to provide for maximum utilization by all construction vehicles.

Construction Specifications

The area of the entrance must be excavated a minimum of 3 inches and must be cleared of all vegetation, roots, and other objectionable material. The filter fabric underliner will then be placed the full width and length of the entrance.

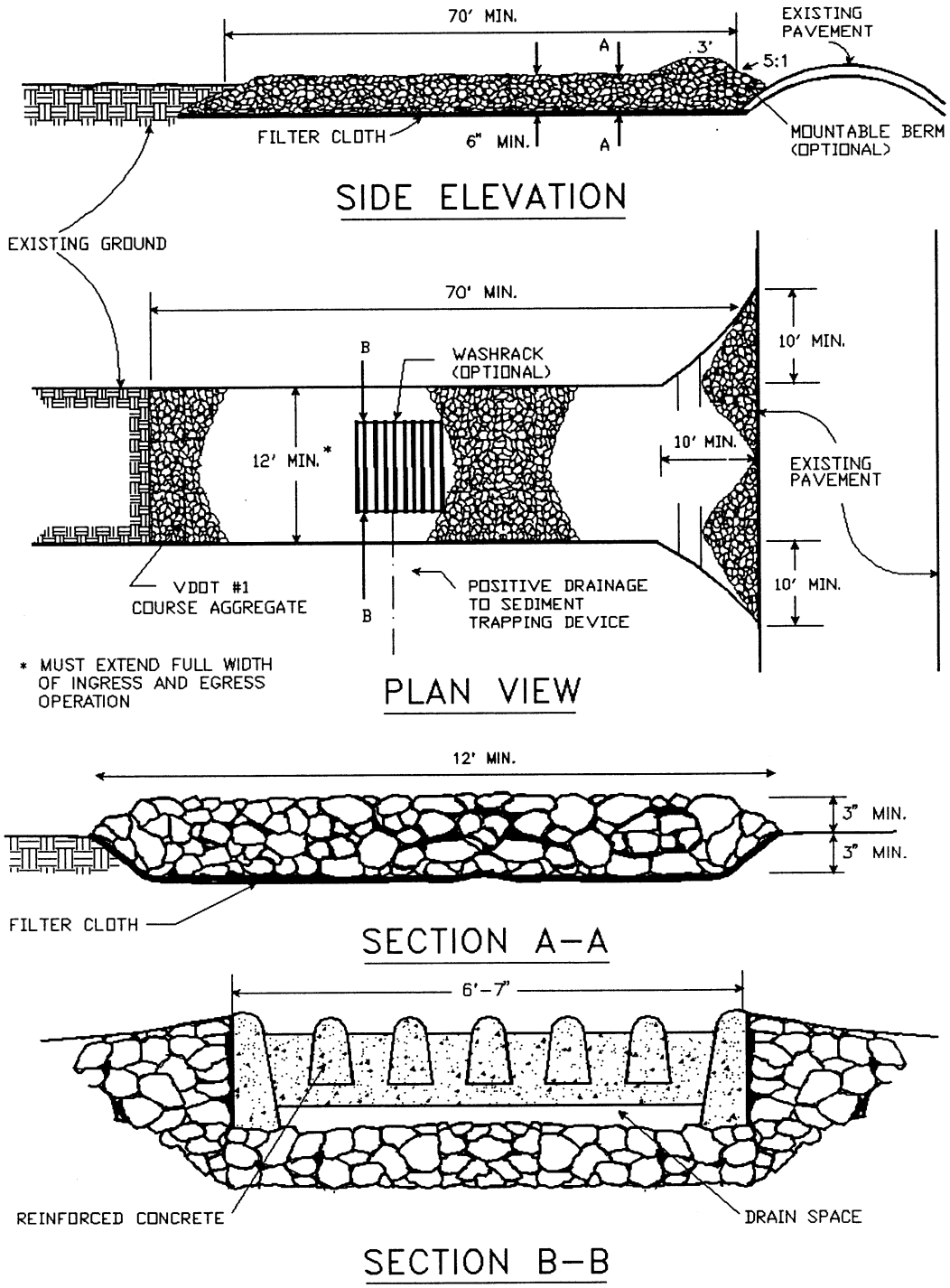
Following the installation of the filter cloth, the stone shall be placed to the specified dimensions. If wash racks are used, they should be installed according to manufacturer's specifications. Any drainage facilities required because of washing should be constructed according to specifications. Conveyance of surface water under entrance, through culverts, shall be provided as required. If such conveyance is impossible, the construction of a "mountable" berm with 5:1 slopes will be permitted.

The filter cloth utilized shall be a woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals and hydrocarbons, be mildew and rot resistant, and conform to the physical properties noted in Table 3.02-A.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment. All materials spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains must be removed immediately. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

STONE CONSTRUCTION ENTRANCE



Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC

Plate 3.02-1

TABLE 3.02-A

CONSTRUCTION SPECIFICATIONS FOR FILTER CLOTH UNDERLINER

Fabric Properties[1]	Light-Duty Entrance[2] (Graded Subgrade)	Heavy-Duty Entrance[3] (Rough Graded)	Test Method
Grab Tensile Strength (lbs.)	200	220	ASTM D1682
Elongation at Failure (%)	50	220	ASTM D1682
Mullen Burst Strength (lbs.)	190	430	ASTM D3786
Puncture Strength (lbs.)	40	125	ASTM D751 (modified)
Equivalent Opening Size (mm)	40-80	40-80	U.S. Standard Sieve CW-02215

[1] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

[2] Light Duty Entrance: Sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Examples of fabrics which can be used are: Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[3] Heavy Duty Entrance: Sites with only rough grading and where most travel would be multi-axle vehicles. Examples of fabrics which can be used are: Trevira Spunbond 1135, Mirafi 600X, or equivalent.

Source: Virginia Highway and Transportation Research Council (VHTRC)

Safety Fencing

STD & SPEC 3.01

SAFETY FENCE

Definition

A protective barrier installed to prevent access to an erosion control measure.

Purpose

To prohibit the undesirable use of an erosion control measure by the public.

Conditions Where Practice Applies

Applicable to any control measure or series of measures which can be considered unsafe by virtue of potential for access by the public.

Planning Considerations

The safety of the public must always be considered at both the planning and implementation phases of a land-disturbing activity. If there is any question concerning the risk of a particular erosion control measure to the general public, the measure should be relocated to a safer area, or an appropriate safety fence should be installed to prevent undesired access. Many times, the danger posed by a control may not be easily seen by plan designers and reviewers - that is when the on-site contractor or inspector must correct such situations in the field. Properly designed and installed safety fences prevent the trespassing of people into potentially dangerous areas, such as children using a sediment basin or a stormwater retention structure as play areas. The installation of these fences will protect people from hazards and the owner from possible litigation.

Two different types of fence will be discussed in this specification. The designer, developer, and contractor should always be sure that the most appropriate type of fence is utilized for a particular need.

Design Criteria

1. Safety fences should be located so as to create a formidable barrier to undesired access, while allowing for the continuation of necessary construction operations.

2. Safety fences are most applicable to the construction of berms, traps, and dams. In use with those structures, safety fences should be located far enough beyond the outer toe of the embankment to allow for the passage of maintenance vehicles. Fences should not be installed across the slope of a dam or dike.

3. The height of the fence shall be a minimum of 5 feet for plastic fence and 6 feet for metal fence. A fence must never be so short as to become an attraction for children to climb on or over.

4. Signs noting potential hazards such as "DANGER-QUICKSAND" or "HAZARDOUS AREA - KEEP OUT" should be posted and easily seen by anyone approaching the protected area.

5. Plastic (polyethylene) fence may be used as safety fencing, primarily in situations where the need is for a temporary barrier (see Plate 3.01-1). The fence should meet the physical requirements noted in the following table:

TABLE 3.01-A

PHYSICAL PROPERTIES OF PLASTIC SAFETY FENCE

Physical Property	Test	Requirements
Recommended color	N/A	"International" orange
Tensile yield	ASTM D638	Average 2000 lbs. per 4 ft. width
Ultimate tensile strength	ASTM D638	Average 2900 lbs. per 4 ft. width
Elongation at break(%)	ASTM D638	Greater than 1000%
Chemical resistance	N/A	Inert to most chemicals and acids

Source: Conwed Plastics

6. Metal or "chain-link" fence should be used when a potentially dangerous control measure will remain in place permanently, such as a stormwater detention or retention basin (see Plate 3.01-1). However, they may also be used for measures which will only serve a temporary function, at the discretion of those responsible for project safety. The metal fence must meet the following physical requirements:

   a. Fabric shall be zinc-coated steel, 2-inch mesh, 9-gauge, minimum.

   b. Zinc coating shall have a minimum weight of 1.8 ounces per square foot.

   c. Posts shall be steel pipe, zinc-coated.

   d. Top nails shall be steel pipe, zinc-coated.

   e. Braces shall be made of zinc-coated steel.

   f. Gates shall be single or double swing, zinc-coated steel. They shall be a minimum of 12-feet wide.

Construction Specifications

1. Safety fences must be installed prior to the E&S measure becoming accessible.

2. The polyethylene web of the plastic safety fence shall be secured to a conventional metal "T" or "U" post driven into the ground to a minimum depth of 18 inches; posts should be spaced at 6-foot centers. See "perspective" view in Plate 3.01-1.

3. The metal safety fence shall be installed as per the following procedure:

   a. Line posts shall be placed at intervals of 10 feet measured from center to center of adjacent posts. In determining the post spacing, measurement will be made parallel with the ground surface. See "perspective" view in Plate 3.01-1.

   b. Posts will be set in concrete and backfilled or anchored by other acceptable means.

   c. Posts set in the tops of concrete walls shall be grouted into preformed holes to a minimum depth of 12 inches.

   d. All corner posts, end posts, gate posts, and pull posts shall be embedded, braced, and trussed as shown in the "Standard Fence - Chain Link" detail found in the latest version of the Virginia Department of Transportation (VDOT) Road and Bridge Standards.

   e. Fencing fabric shall not be stretched until at least 4 days after the posts are grouted into walls or 14 days after the posts are set into concrete.

   f. The fabric shall be stretched taut and securely fastened, by means of tie clips, to the posts at intervals not exceeding 15 inches and to the top rails or tension wires at intervals not exceeding 2 feet. Care shall be taken to equalize the tension on each side of each post.

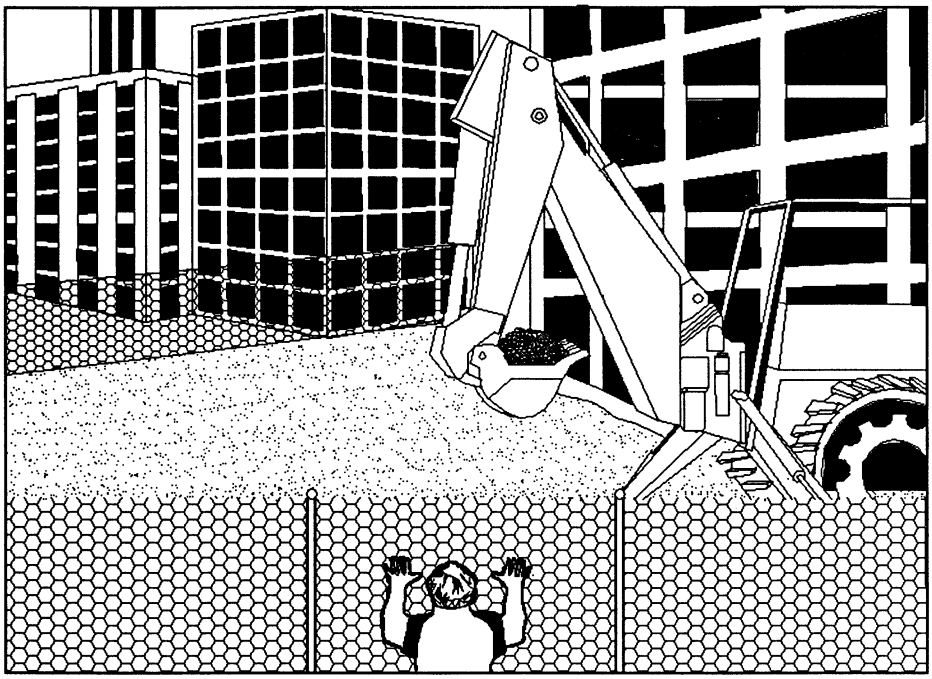
4. Applicable warning signs noting hazardous conditions must be installed immediately upon installation of safety fence.

Maintenance

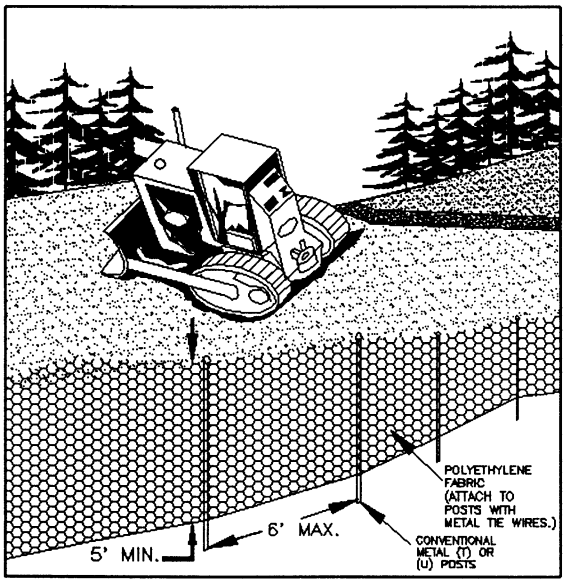
1. Safety fence shall be checked regularly for weather-related or other damage. Any necessary repairs must be made immediately.

2. Care should be taken to secure all access points (gates) at the end of each working day. All locking devices must be repaired or replaced as necessary.

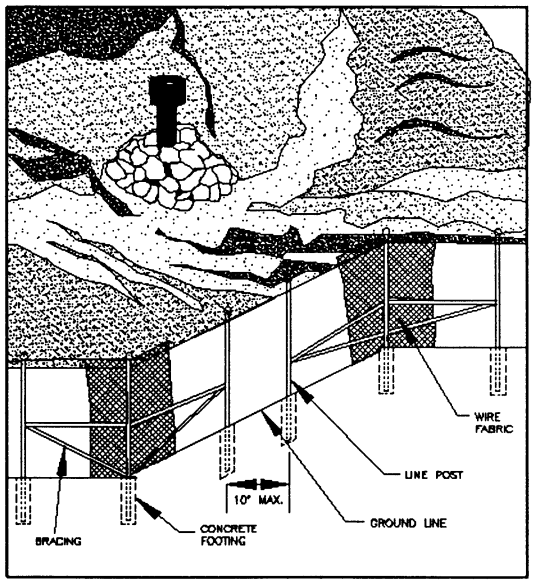
SAFETY FENCE



PERSPECTIVE VIEW



PERSPECTIVE VIEW
PLASTIC FENCE



PERSPECTIVE VIEW
METAL FENCE

Source: Adapted from Conwed Plastics and VDOT Road and Bridge Standards

Plate 3.01-1

Construction Road Stabilization

STD & SPEC 3.03

CONSTRUCTION ROAD STABILIZATION

Definition

The temporary stabilization of access roads, subdivision roads, parking areas, and other on-site vehicle transportation routes with stone immediately after grading.

Purposes

1. To reduce the erosion of temporary roadbeds by construction traffic during wet weather.

2. To reduce the erosion and subsequent regrading of permanent roadbeds between the time of initial grading and final stabilization.

Conditions Where Practice Applies

Wherever stone-base roads or parking areas are constructed, whether permanent or temporary, for use by construction traffic.

Planning Considerations

Areas which are graded for construction vehicle transport and parking purposes are especially susceptible to erosion. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires which generate significant quantities of sediment that may pollute nearby streams or be transported off site on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Immediate stabilization of such areas with stone may cost money at the outset, but it may actually save money in the long run by increasing the usefulness of the road during wet weather.

Permanent roads and parking areas should be paved as soon as possible after grading. However, it is understandable that weather conditions or the potential for damage may not make paving feasible in the early phases of the development project. As an alternative, the early application of stone may solve potential erosion and stability problems and eliminate later regrading costs. Some of the stone will also probably remain in place for use as part of the final base course in the construction of the road.

Specifications

Temporary Access Roads and Parking Areas

1. Temporary roads shall follow the contour of the natural terrain to the extent possible. Slopes should not exceed 10 percent.

2. Temporary parking areas should be located on naturally flat areas to minimize grading. Grades should be sufficient to provide drainage but should not exceed 4 percent.

3. Roadbeds shall be at least 14 feet wide for one-way traffic and 20 feet wide for two-way traffic.

4. All cuts and fills shall be 2:1 or flatter to the extent possible.

5. Drainage ditches shall be provided as needed and shall be designed and constructed in accordance with STORMWATER CONVEYANCE CHANNEL, Std. & Spec. 3.17.

6. The roadbed or parking surface shall be cleared of all vegetation, roots and other objectionable material.

7. A 6-inch course of VDOT #1 Coarse Aggregate shall be applied immediately after grading or the completion of utility installation within the right-of-way. Filter fabric may be applied to the roadbed for additional stability. Design specifications for filter fabric can be found within Std. & Spec. 3.02, TEMPORARY STONE CONSTRUCTION ENTRANCE. In "heavy duty" traffic situations (see Table 3.02-A), stone should be placed at an 8- to 10-inch depth to avoid excessive dissipation or maintenance needs.

Permanent Roads and Parking Areas

Permanent roads and parking areas shall be designed and constructed in accordance with applicable VDOT or local criteria except that an initial base course of gravel of at least 6 inches shall be applied immediately following grading.

Vegetation

All roadside ditches, cuts, fills and disturbed areas adjacent to parking areas and roads shall be stabilized with appropriate temporary or permanent vegetation according to the applicable standards and specifications contained in this handbook.

Maintenance

Both temporary and permanent roads and parking areas may require periodic top dressing with new gravel. Seeded areas adjacent to the roads and parking areas should be checked periodically to ensure that a vigorous stand of vegetation is maintained. Roadside ditches and other drainage structures should be checked regularly to ensure that they do not become clogged with silt or other debris.

Straw Bale Barriers

STD & SPEC 3.04

STRAW BALE BARRIER

STB

Definition

A temporary sediment barrier consisting of a row of entrenched and anchored straw bales.

Purposes

1. To intercept and detain small amounts of sediment from disturbed areas of limited extent in order to prevent sediment from leaving the construction site.

2. To decrease the velocity of sheet flows.

Conditions Where Practice Applies

1. Below disturbed areas subject to sheet and rill erosion.

2. Where the size of the drainage area is no greater than one-fourth of an acre per 100 feet of barrier length; the maximum slope length behind the barrier is 100 feet; and the maximum slope gradient behind the barrier is 50 percent (2:1).

3. Where effectiveness is required for less than 3 months.

4. Under no circumstances should straw bale barriers be constructed in live streams or in swales where there is the possibility of a washout.

5. The measure should not be used where water may concentrate in defined ditches and minor swales.

6. Straw bale barriers shall not be used on areas where rock or another hard surface prevents the full and uniform anchoring of the barrier.

Planning Considerations

Based on observations made in Virginia, Pennsylvania, Maryland and other parts of the nation, straw bale barriers have not been as effective as many users had hoped they would be - especially when used to slow down and filter concentrated flows. They should be used judiciously and with caution as erosion control measures. There are three major reasons for such ineffectiveness.

First, improper utilization of straw bale barriers has been a major problem. Straw bale barriers have been used in streams and drainageways where high water depth and velocities have destroyed or damaged the control. Secondly, improper placement and installation of the barriers, such as staking the bales directly to the ground with no soil seal or entrenchment, has allowed undercutting and end flow. This has resulted in additions of, rather than removal of, sediment from runoff waters. Finally, inadequate maintenance lowers the effectiveness of these barriers. Trapping efficiencies of carefully installed straw bale barriers on one project in Virginia dropped from 57% to 16% in one month due to lack of maintenance.

There are serious questions about the continued use of straw bale barriers as they are presently installed and maintained. Averaging from $3 to $6 per linear foot, the thousands of straw bale barriers used annually in Virginia represent such a considerable expense that optimum installation procedures should be emphasized.

Design Criteria

A formal design is not required. However, an effort should be made to locate the straw bale barrier, as well as other perimeter controls, at least 5 to 7 feet from the base of disturbed slopes with grades greater than 7%. This will help prevent the measure from being rendered useless following the initial movement of soil.

Construction Specifications

Sheet Flow Application

1. Bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

2. All bales shall be either wire-bound or string-tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings (see Plate 3.04-1).

3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier (see Plate 3.04-1).

4. Each bale shall be securely anchored by at least two stakes (minimum dimensions 2 inches x 2 inches x 36 inches) or standard "T" or "U" steel posts (minimum weight of 1.33 pounds per linear foot) driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

5. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency.

6. Inspection shall be frequent and repair or replacement shall be made promptly as needed.

7. Straw bale barriers shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

Maintenance

1. Straw bale barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.

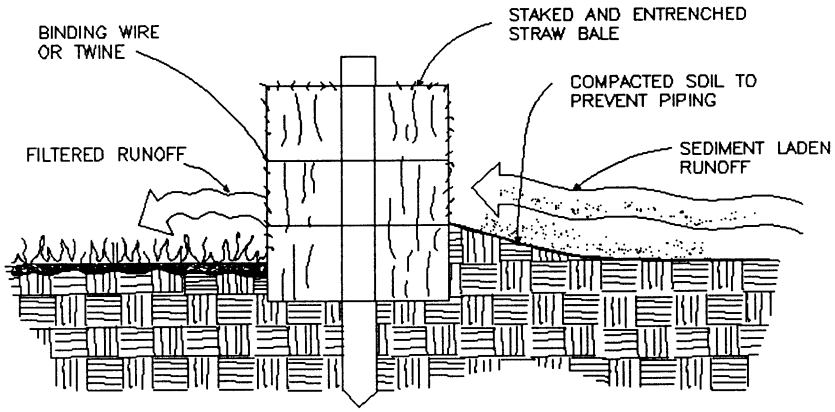
2. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales.

3. Necessary repairs to barriers or replacement of bales shall be accomplished promptly.

4. Sediment deposits should be removed after each rainfall. They must be removed when the level of deposition reaches approximately one-half the height of the barrier.

5. Any sediment deposits remaining in place after the straw bale barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.

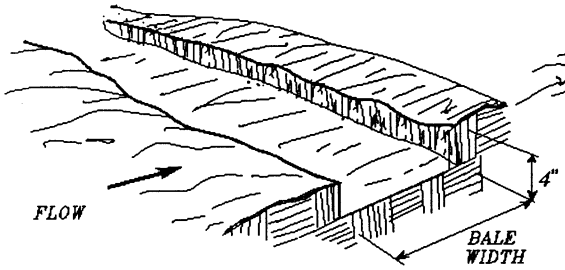
STRAW BALE BARRIER

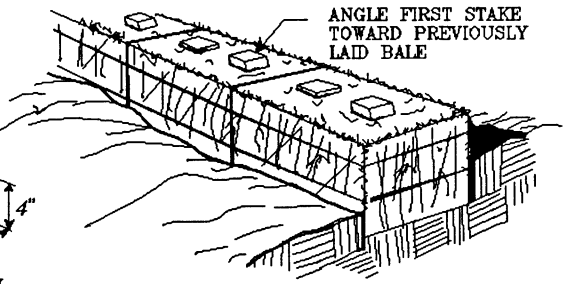


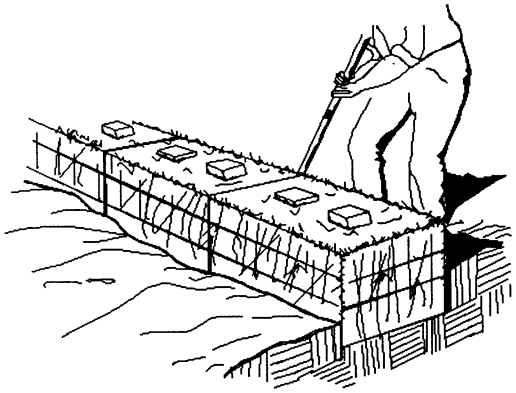
PROPERLY INSTALLED STRAW BALE
(CROSS SECTION)

1. EXCAVATE THE TRENCH.

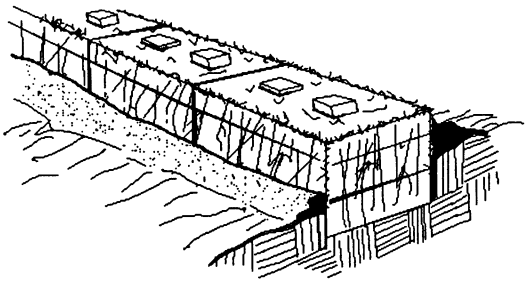
2. PLACE AND STAKE STRAW BALES.







3. WEDGE LOOSE STRAW BETWEEN BALES.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

CONSTRUCTION OF STRAW BALE BARRIER

Source: Va. DSWC

Plate 3.04-1

Temporary Diversion Dikes

STD & SPEC 3.09

TEMPORARY DIVERSION DIKE

DD

Definition

A temporary ridge of compacted soil constructed at the top or base of a sloping disturbed area.

Purposes

1. To divert storm runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet.

2. To divert sediment-laden runoff from a disturbed area to a sediment-trapping facility such as a sediment trap or sediment basin.

Conditions Where Practice Applies

Wherever stormwater runoff must be temporarily diverted to protect disturbed areas and slopes or retain sediment on site during construction. These structures generally have a life expectancy of 18 months or less, which can be prolonged with proper maintenance.

Planning Considerations

A temporary diversion dike is intended to divert overland sheet flow to a stabilized outlet or a sediment-trapping facility during establishment of permanent stabilization on sloping disturbed areas. When used a the top of a slope, the structure protects exposed slopes by keeping upland runoff away. When used at the base of a slope, the structure protects adjacent and downstream areas by diverting sediment-laden runoff to a sediment trapping facility.

As per M.S. #5, it is very important that a temporary diversion dike be stabilized immediately following installation with temporary or permanent vegetation to prevent erosion of the dike itself. The gradient of the channel behind the dike is also an important consideration. The dike must have a positive grade to assure drainage, but if the gradient is too great, precautions must be taken to prevent erosion due to high-velocity channel flow behind the dike. The cross-section of the channel which runs behind the dike should be of a parabolic or trapezoidal shape to help inhibit a high velocity of flow which could arise in a vee ditch.

This practice is considered an economical one because it uses material available on the site and can usually be constructed with equipment needed for site grading. The useful life of the practice can be extended by stabilizing the dike with vegetation. Diversion dikes are preferable to silt fence because they are more durable, less expensive, and require much less maintenance when constructed properly. Along with a TEMPORARY SEDIMENT TRAP (Std. & Spec. 3.13), they become a logical choice for a control measure once the control limits of the silt fence or straw bale barrier have been exceeded.

Temporary diversion dikes are often used as a perimeter control in association with a sediment trap or a sediment basin, or a series of sediment-trapping facilities, on moderate to large construction sites. If installed properly and in the first phase of grading, maintenance costs are very low. Often, cleaning of sediment-trapping facilities is the only associated maintenance requirement.

As specified herein, this practice is intended to be temporary. However, with more stringent design criteria, it can be made permanent in accordance with DIVERSIONS (Std. & Spec. 3.12).

Design Criteria

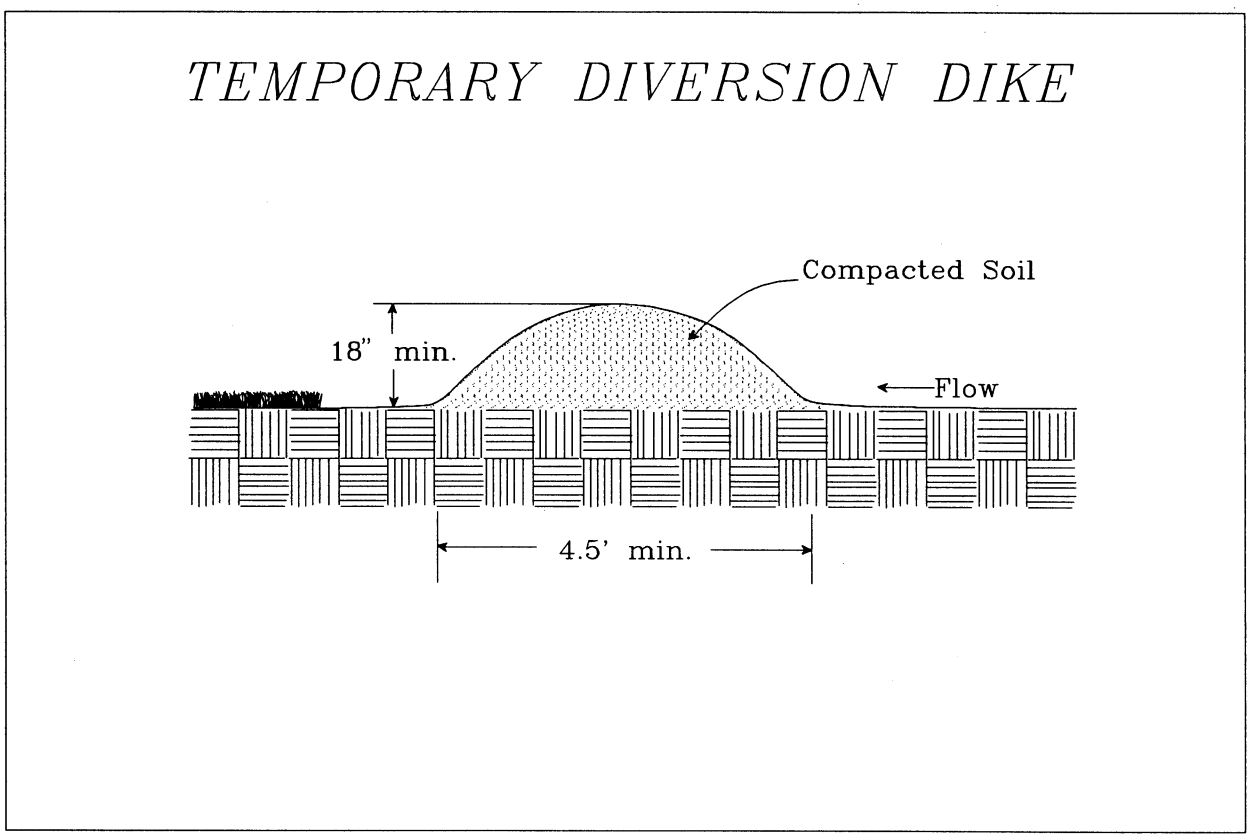
No formal design is required. The following criteria shall be met:

Drainage Area

The maximum allowable drainage area is 5 acres.

Height

The minimum allowable height measured from the upslope side of the dike is 18 inches (see Plate 3.09-1).



Source: Va. DSWC Plate 3.09-1

Side Slopes

1½:1 or flatter, along with a minimum base width of 4.5 feet (see Plate 3.09-1).

Grade

The channel behind the dike shall have a positive grade to a stabilized outlet. If the channel slope is less than or equal to 2%, no stabilization is required. If the slope is greater than 2%, the channel shall be stabilized in accordance with Std. & Spec. 3.17, STORMWATER CONVEYANCE CHANNEL.

Outlet

1. The diverted runoff, if free of sediment, must be released through a stabilized outlet or channel.

2. Sediment-laden runoff must be diverted and released through a sediment-trapping facility such as a TEMPORARY SEDIMENT TRAP (Std. & Spec. 3.13) or TEMPORARY SEDIMENT BASIN (Std. & Spec. 3.14).

Construction Specifications

1. Temporary diversion dikes must be installed as a first step in the land-disturbing activity and must be functional prior to upslope land disturbance.

2. The dike should be adequately compacted to prevent failure.

3. Temporary or permanent seeding and mulch shall be applied to the dike immediately following its construction.

4. The dike should be located to minimize damages by construction operations and traffic.

Maintenance

The measure shall be inspected after every storm and repairs made to the dike, flow channel, outlet or sediment trapping facility, as necessary. Once every two weeks, whether a storm event has occurred or not, the measure shall be inspected and repairs made if needed. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

Storm Drain Inlet Protection

STD & SPEC 3.07

STORM DRAIN INLET PROTECTION

IP

Definition

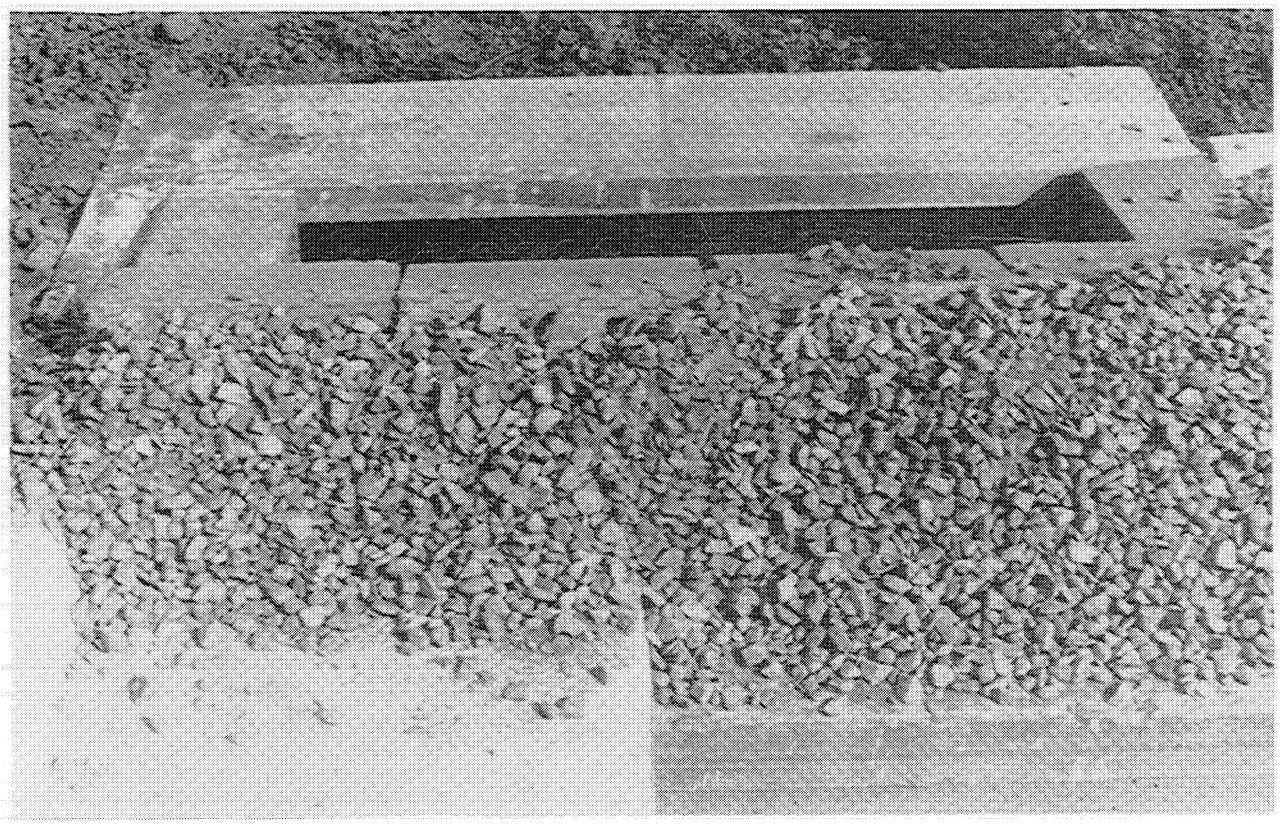
A sediment filter or an excavated impounding area around a storm drain drop inlet or curb inlet.

Purpose

To prevent sediment from entering storm drainage systems prior to permanent stabilization of the disturbed area.

Conditions Where Practice Applies

Where storm drain inlets are to be made operational before permanent stabilization of the corresponding disturbed drainage area. Different types of structures are applicable to different conditions (see Plates 3.07-1 through 3.07-8).



Planning Considerations

Storm sewers which are made operational prior to stabilization of the associated drainage areas can convey large amounts of sediment to natural drainageways. In case of extreme sediment loading, the storm sewer itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets.

This practice contains several types of inlet filters and traps which have different applications dependent upon site conditions and type of inlet. Other innovative techniques for accomplishing the same purpose are encouraged, but only after specific plans and details are submitted to and approved by the appropriate Plan-Approving Authority.

Care should be taken when choosing a specific type of inlet protection. Field experience has shown that inlet protection which causes excessive ponding in an area of high construction activity may become so inconvenient that it is removed or bypassed, thus transmitting sediment-laden flows unchecked. In such situations, a structure with an adequate overflow mechanism should be utilized.

The following inlet protection devices are for drainage areas of one acre or less. Runoff from larger disturbed areas should be routed to a TEMPORARY SEDIMENT TRAP (Std. & Spec. 3.13) or a TEMPORARY SEDIMENT BASIN (Std. & Spec. 3.14).

The best way to prevent sediment from entering the storm sewer system is to stabilize the site as quickly as possible, preventing erosion and stopping sediment at its source.

Stone is utilized as the chief ponding/filtering agent in most of the inlet protection types described in this specification. The various types of "coarse aggregates" which are depicted are able to filter out sediment mainly through slowing down flows directed to the inlet by creating an increased flow path for the stormwater (through void space in the respective stone). The stone filtering medium by no means slows stormwater flowrate as does filter cloth and therefore cannot provide the same degree of filter efficiency when smaller silt and clay particles are introduced into stormwater flows. However, as mentioned earlier, excessive ponding in busy areas adjacent to stormwater inlets is in many cases unacceptable - that is why stone must be utilized with many installations.

Fortunately, in most instances, inlet protection utilizing stone should not be the sole control measure. At the time that storm sewer inlet and associated appurtances become operational, areas adjacent to the structures are most likely at final grade or will not be altered for extended periods; this is the time when TEMPORARY SEEDING (Std. & Spec. 3.31) and other appropriate controls should be implemented to enhance sediment-loss mitigation. In addition, by varying stone sizes used in the construction of inlet protection, a greater degree of sediment removal can be obtained. As an option, filter cloth can be used with the stone in these devices to further enhance sediment removal. Notably, the potential inconvenience of excessive ponding must be examined with these choices, especially the latter.

Design Criteria

1. The drainage area shall be no greater than 1 acre.

2. The inlet protection device shall be constructed in a manner that will facilitate clean-out and disposal of trapped sediment and minimize interference with construction activities.

3. The inlet protection devices shall be constructed in such a manner that any resultant ponding of stormwater will not cause excessive inconvenience or damage to adjacent areas or structures.

4. Design criteria more specific to each particular inlet protection device will be found on Plates 3.07-1 through 3.07-8.

5. For the inlet protection devices which utilize stone as the chief ponding/filtering medium, a range of stone sizes is offered; VDOT #3, #357, or #5 Coarse Aggregate should be used. The designer/plan reviewer should attempt to get the greatest amount of filtering action possible (by using smaller-sized stone), while not creating significant ponding problems.

6. In all designs which utilize stone with a wire-mesh support as a filtering mechanism, the stone can be completely wrapped with the wire mesh to improve stability and provide easier cleaning.

7. Filter Fabric may be added to any of the devices which utilize "coarse aggregate" stone to significantly enhance sediment removal. The fabric, which must meet the physical requirements noted for "extra strength" found in Table 3.05-B, should be secured between the stone and the inlet (on wire-mesh if it is present). As a result of the significant increase in filter efficiency provided by the fabric, a larger range of stone sizes (VDOT #1, #2 or #3 Coarse Aggregate) may be utilized with such a configuration. The larger stone will help keep larger sediment masses from clogging the cloth. Notably, significant ponding may occur at the inlet if filter cloth is utilized in this manner.

Construction Specifications

1. Silt Fence Drop Inlet Protection

   a. Silt Fence shall conform to the construction specifications for "extra strength" found in Table 3.05-B and shall be cut from a continuous roll to avoid joints.

   b. For stakes, use 2 x 4-inch wood (preferred) or equivalent metal with a minimum length of 3 feet.

c. Space stakes evenly around the perimeter of the inlet a maximum of 3-feet apart, and securely drive them into the ground, approximately 18-inches deep (see Plate 3.07-1).

d. To provide needed stability to the installation, frame with 2 x 4-inch wood strips around the crest of the overflow area at a maximum of 1½ feet above the drop inlet crest.

e. Place the bottom 12 inches of the fabric in a trench (see Plate 3.07-1) and backfill the trench with 12 inches of compacted soil.

f. Fasten fabric securely by staples or wire to the stakes and frame. Joints must be overlapped to the next stake.

g. It may be necessary to build a temporary dike on the downslope side of the structure to prevent bypass flow.

2. Gravel and Wire Mesh Drop Inlet Sediment Filter

a. Wire mesh shall be laid over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure. Wire mesh with 1/2-inch openings shall be used. If more than one strip of mesh is necessary, the strips shall be overlapped.

b. Coarse aggregate shall be placed over the wire mesh as indicated on Plate 3.07-2. The depth of stone shall be at least 12 inches over the entire inlet opening. The stone shall extend beyond the inlet opening at least 18 inches on all sides.

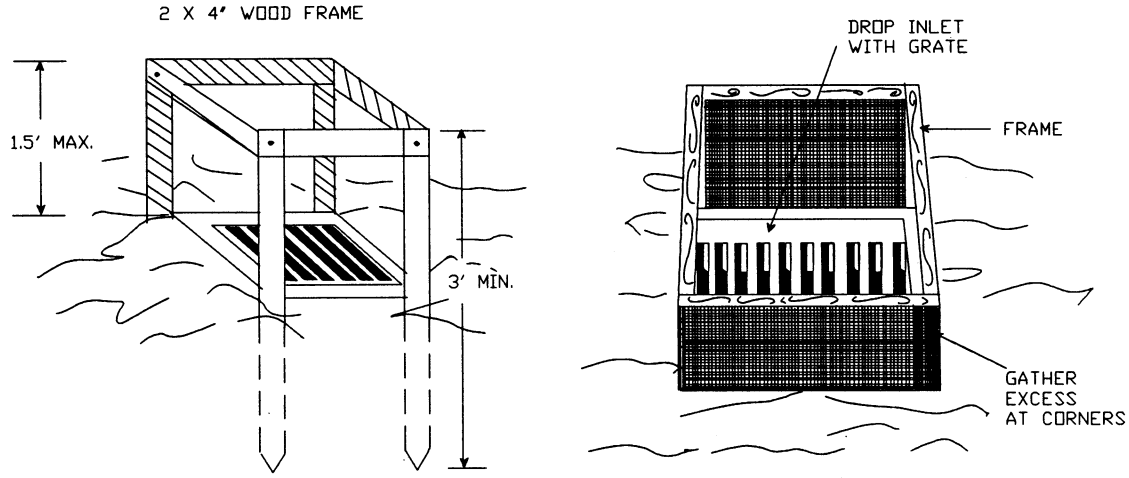
c. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and/or replaced.

Note: This filtering device has no overflow mechanism; therefore, ponding is likely especially if sediment is not removed regularly. This type of device must never be used where overflow may endanger an exposed fill slope. Consideration should also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, adjacent property, etc.

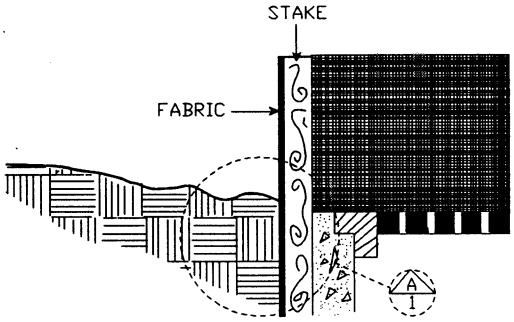
3. Block and Gravel Drop Inlet Sediment Filter

a. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, with the ends of adjacent blocks abutting. The height of the barrier can be varied, depending on design needs, by stacking combinations of 4-inch, 8-inch and 12-inch wide blocks. The barrier of blocks shall be at least 12-inches high and no greater than 24-inches high.

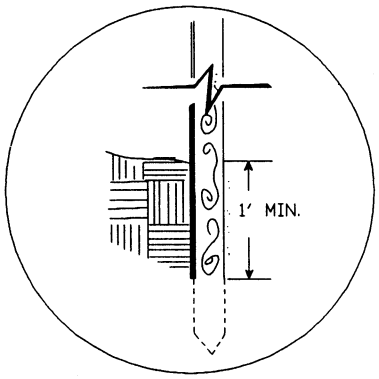
SILT FENCE DROP INLET PROTECTION



PERSPECTIVE VIEWS



ELEVATION OF STAKE AND FABRIC ORIENTATION



DETAIL A

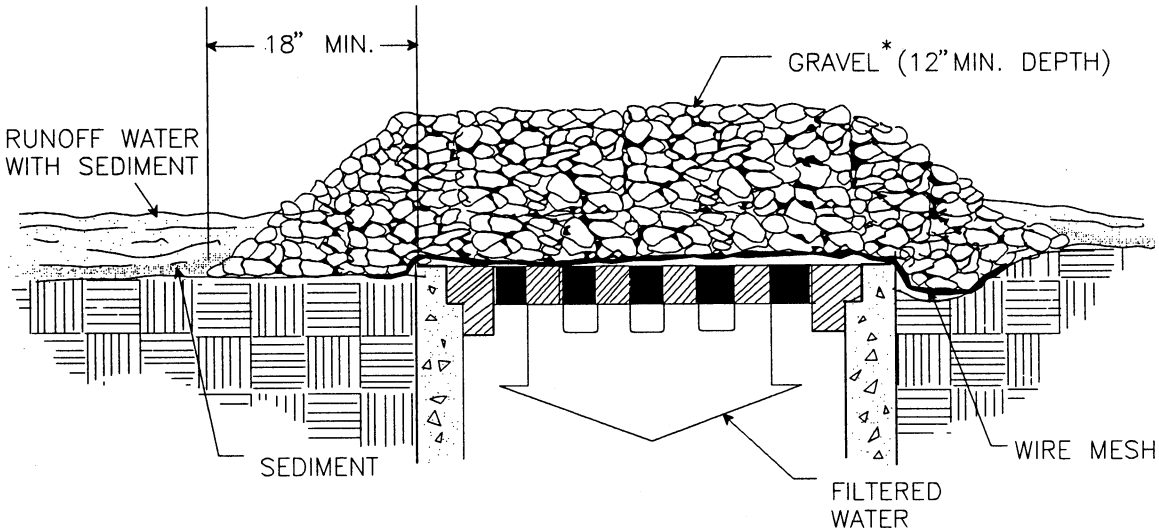
SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

Source: N.C. Erosion and Sediment Control Planning and Design Manual, 1988

Plate 3.07-1

GRAVEL AND WIRE MESH DROP INLET SEDIMENT FILTER



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY CONCENTRATED FLOWS ARE EXPECTED, BUT NOT WHERE PONDING AROUND THE STRUCTURE MIGHT CAUSE EXCESSIVE INCONVENIENCE OR DAMAGE TO ADJACENT STRUCTURES AND UNPROTECTED AREAS.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE.

Source: Va. DSWC

Plate 3.07-2

b. Wire mesh shall be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire mesh with 1/2-inch openings shall be used.

c. Stone shall be piled against the wire to the top of the block barrier, as shown in Plate 3.07-3.

d. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and replaced.

4. Excavated Drop Inlet Sediment Trap

a. The excavated trap shall be sized to provide a minimum storage capacity calculated at the rate of 134 cubic yards per acre of drainage area. A trap shall be no less than 1-foot nor more than 2-feet deep measured from the top of the inlet structure. Side slopes shall not be steeper than 2:1 (see Plate 3.07-4).

b. The slope of the basin may vary to fit the drainage area and terrain. Observations must be made to check trap efficiency and modifications shall be made as necessary to ensure satisfactory trapping of sediment. Where an inlet is located so as to receive concentrated flows, such as in a highway median, it is recommended that the basin have a rectangular shape in a 2:1 (length/width) ratio, with the length oriented in the direction of the flow.

c. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Removed sediment shall be deposited in a suitable area and in a manner such that it will not erode.

5. Sod Drop Inlet Sediment Filter

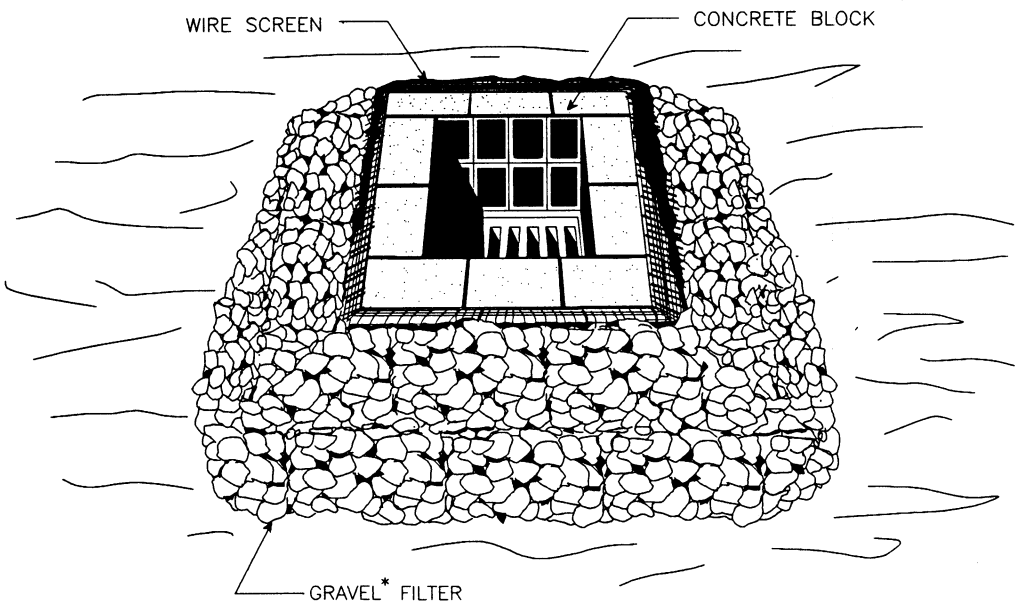
a. Soil shall be prepared and sod installed according to the specifications in Std. & Spec. 3.33, SODDING.

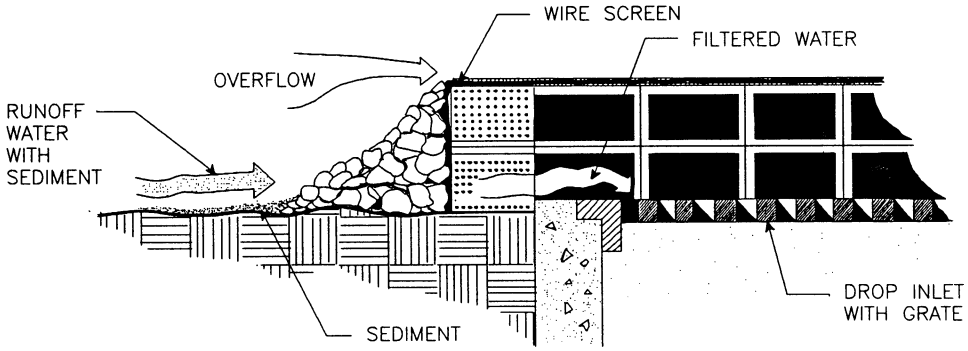
b. Sod shall be placed to form a turf mat covering the soil for a distance of 4 feet from each side of the inlet structure, as depicted in Plate 3.07-5.

6. Gravel Curb Inlet Sediment Filter

a. Wire mesh with 1/2-inch openings shall be placed over the curb inlet opening so that at least 12 inches of wire extends across the inlet cover and at least 12 inches of wire extends across the concrete gutter from the inlet opening, as depicted in Plate 3.07-6.

BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER





SPECIFIC APPLICATION

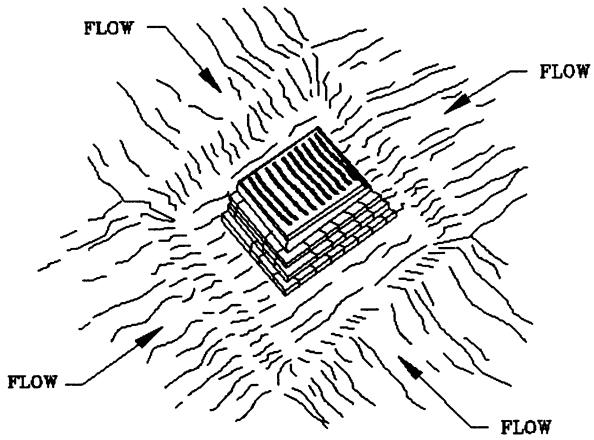
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

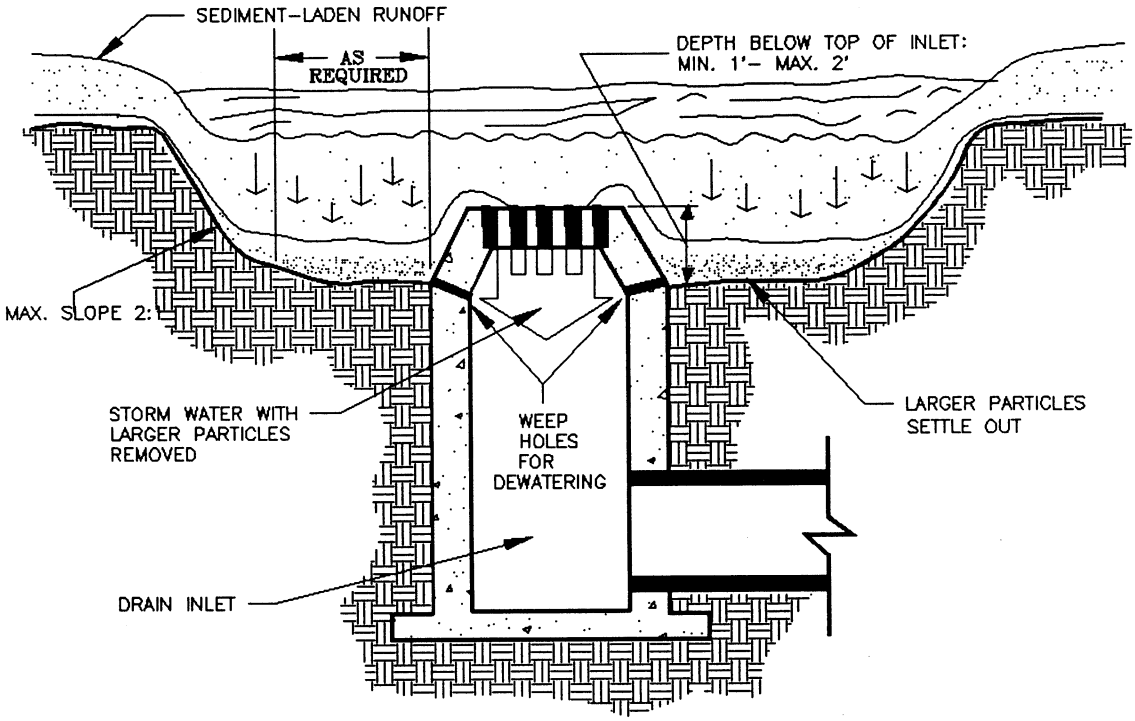
* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE.

Source: Va. DSWC

Plate 3.07-3

EXCAVATED DROP INLET SEDIMENT TRAP





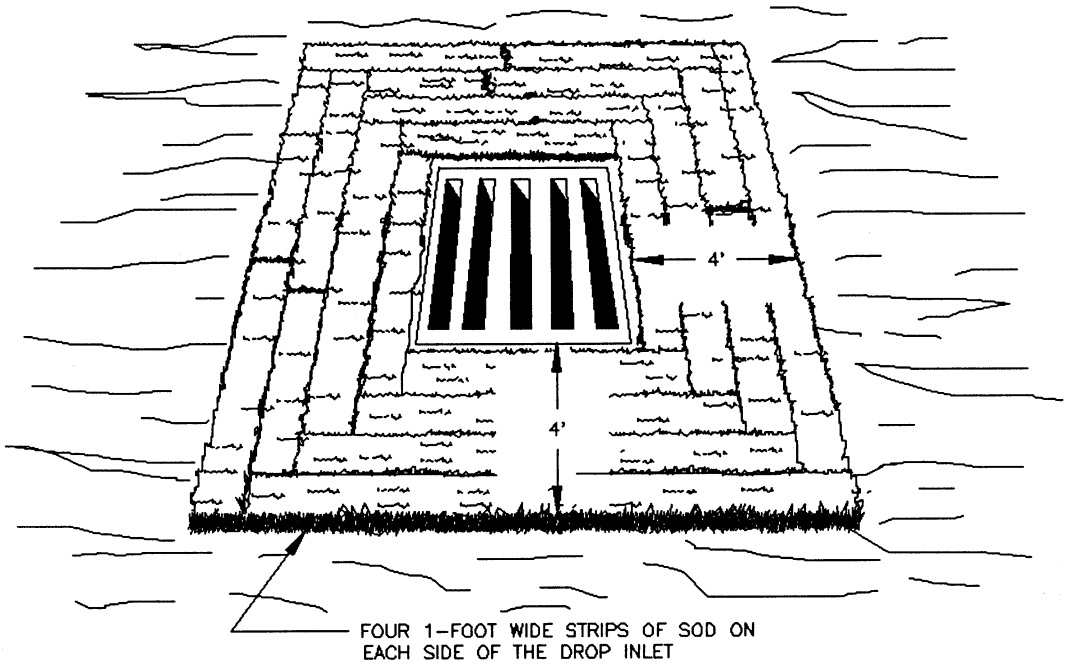
SPECIFIC APPLICATION

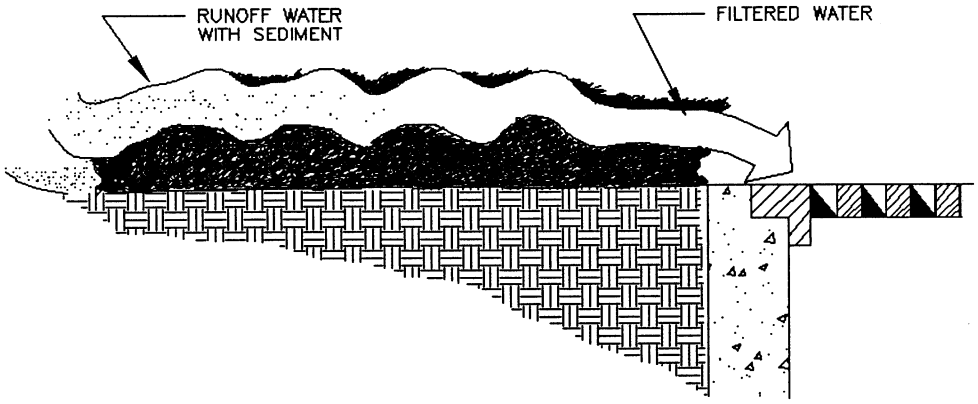
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPABILITY AND EASE OF MAINTENANCE ARE DESIRABLE.

Source: Michigan Soil Erosion and Sediment Control Guidebook, 1975, and USDA-SCS

Plate 3.07-4

SOD DROP INLET SEDIMENT FILTER





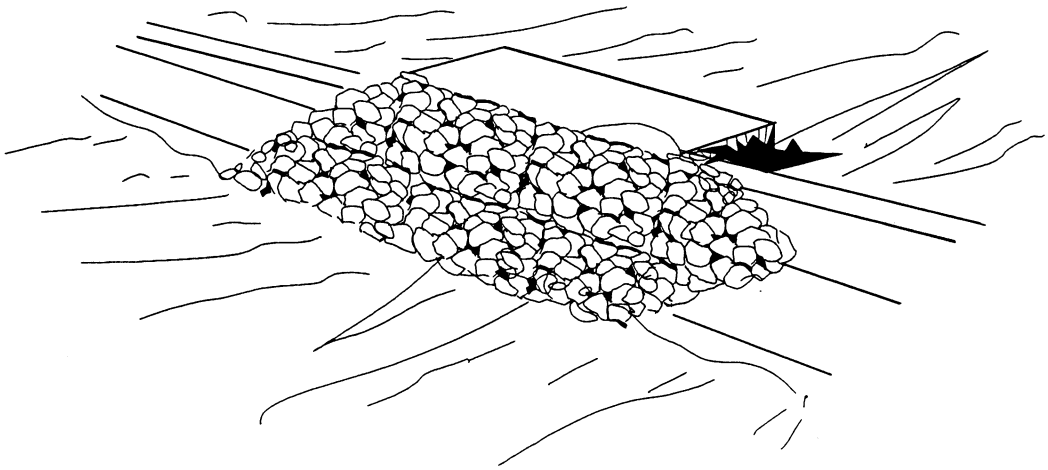
SPECIFIC APLLICATION

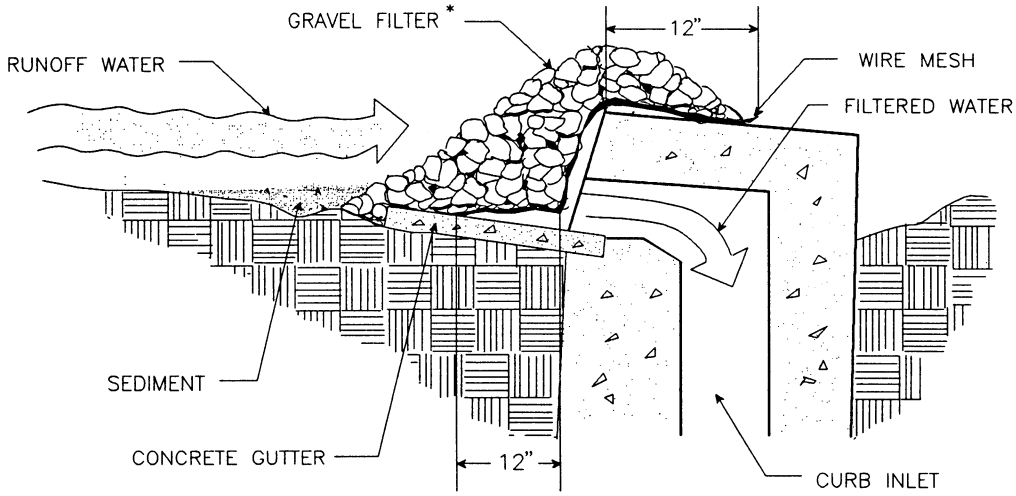
THIS METHOD OF INLET PROTECTION IS APPPLICABLE ONLY AT THE TIME OF PERMANENT SEEDING, TO PROTECT THE INLET FROM SEDIMENT AND MULCH MATERIAL UNTIL PERMANENT VEGETATION HAS BECOME ESTABLISHED.

Source: Va. DSWC

Plate 3.07-5

GRAVEL CURB INLET SEDIMENT FILTER





SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE PONDING IN FRONT OF THE STRUCTURE IS NOT LIKELY TO CAUSE INCONVENIENCE OR DAMAGE TO ADJACENT STRUCTURES AND UNPROTECTED AREAS.

* GRAVEL SHALL BE VDOT #3, #357 OR 5 COARSE AGGREGATE.

Source: Va. DSWC

Plate 3.07-6

b. Stone shall be piled against the wire so as to anchor it against the gutter and inlet cover and to cover the inlet opening completely.

c. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the block, cleaned and replaced.

7. Curb Inlet Protection with 2-inch x 4-inch Wooden Weir

a. Attach a continuous piece of wire mesh (30-inch minimum width x inlet throat length plus 4 feet) to the 2-inch x 4-inch wooden weir (with a total length of throat length plus 2 feet) as shown in Plate 3.07-7. Wood should be "construction grade" lumber.

b. Place a piece of approved "extra-strength" filter cloth of the same dimensions as the wire mesh over the wire mesh and securely attach to the 2-inch x 4-inch weir.

c. Securely nail the 2-inch x 4-inch weir to the 9-inch long vertical spacers which are to be located between the weir and inlet face at a maximum 6-foot spacing.

d. Place the assembly against the inlet throat and nail 2-foot (minimum) lengths of 2-inch x 4-inch board to the top of the weir at spacer locations. These 2-inch x 4-inch anchors shall extend across the inlet tops and be held in place by sandbags or alternate weight.

e. The assembly shall be placed so that the end spacers are a minimum 1 foot beyond both ends of the throat opening.

f. Form the wire mesh and filter cloth to the concrete gutter and against the face of curb on both sides of the inlet. Place coarse aggregate over the wire mesh and filter fabric in such a manner as to prevent water from entering the inlet under or around the filter cloth.

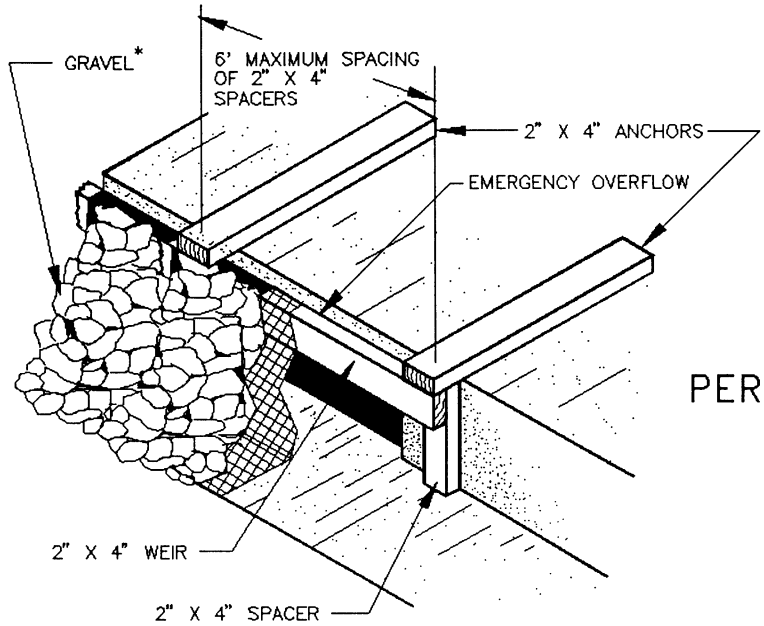
g. This type of protection must be inspected frequently and the filter cloth and stone replaced when clogged with sediment.

h. Assure that storm flow does not bypass inlet by installing temporary earth or asphalt dikes directing flow into inlet.

8. Block and Gravel Curb Inlet Sediment Filter

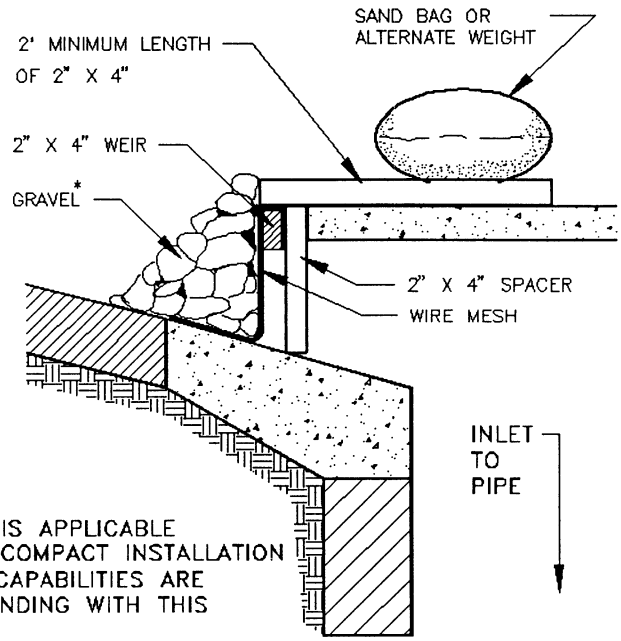
a. Two concrete blocks shall be placed on their sides abutting the curb at either side of the inlet opening.

CURB INLET PROTECTION WITH 2-INCH X 4-INCH WOODEN WEIR



PERSPECTIVE VIEW

SIDE ELEVATION



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE TO CURB INLETS WHERE A STURDY, COMPACT INSTALLATION IS DESIRED. EMERGENCY OVERFLOW CAPABILITIES ARE MINIMAL, SO EXPECT SIGNIFICANT PONDING WITH THIS MEASURE.

*GRAVEL SHALL BE VDOT COARSE AGGREGATE #3, #357 OR #5

Source: 1983 Maryland Standards and Specifications for Soil Erosion and Sediment Control, and USDA-SCS

Plate 3.07-7

b. A 2-inch x 4-inch stud shall be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.

c. Concrete blocks shall be placed on their sides across the front of the inlet and abutting the spacer blocks as depicted in Plate 3.07-8.

d. Wire mesh shall be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire mesh with 1/2-inch openings shall be used.

e. Coarse aggregate shall be piled against the wire to the top of the barrier as shown in Plate 3.07-8.

f. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and/or replaced.

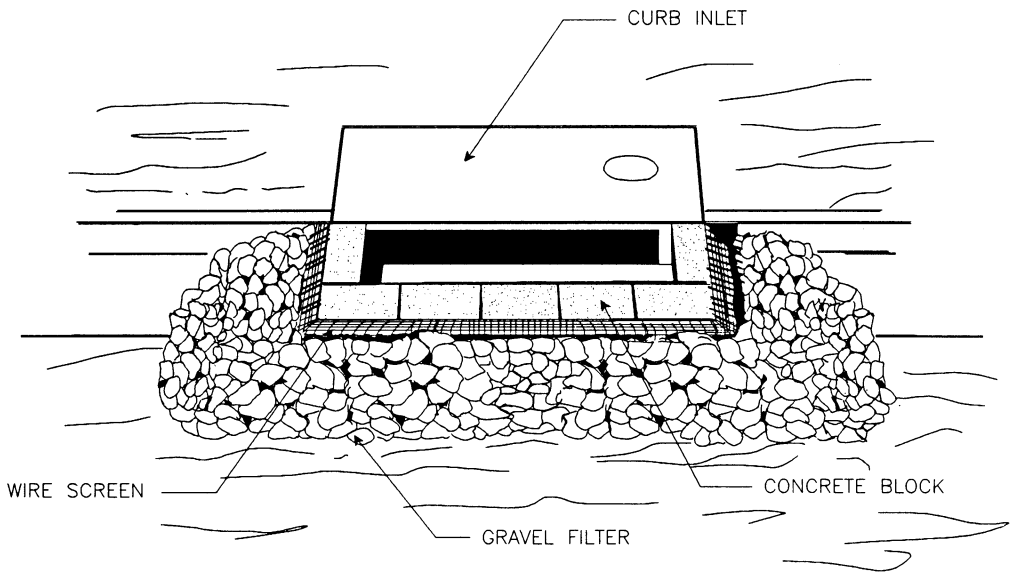
Maintenance

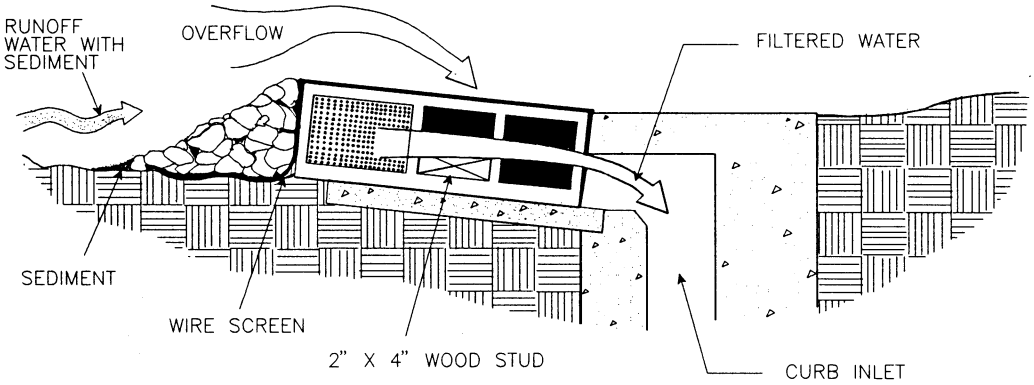
1. The structure shall be inspected after each rain and repairs made as needed.

2. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.

3. Structures shall be removed and the area stabilized when the remaining drainage area has been properly stabilized.

BLOCK & GRAVEL CURB INLET SEDIMENT FILTER





SPECIAL APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING IN FRONT OF THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE

Source: Va. DSWC

Plate 3.07-8

Sediment Traps

STD & SPEC 3.13

TEMPORARY SEDIMENT TRAP

ST

Definition

A temporary ponding area formed by constructing an earthen embankment with a stone outlet.

Purpose

To detain sediment-laden runoff from small disturbed areas long enough to allow the majority of the sediment to settle out.

Conditions Where Practice Applies

1. Below disturbed areas where the total contributing drainage area is less than 3 acres.

2. Where the sediment trap will be used no longer than 18 months (the maximum useful life is 18 months).

3. The sediment trap may be constructed either independently or in conjunction with a TEMPORARY DIVERSION DIKE (Std. & Spec. 3.09).

Planning Considerations

Sediment traps should be used only for small drainage areas. If the contributing drainage area is 3 acres or greater, refer to SEDIMENT BASIN (Std. & Spec. 3.14).

Sediment traps, along with other perimeter controls intended to trap sediment, shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.

Recent studies have been conducted on the performance of sediment traps (and basins) which were constructed using the design criteria found in previous editions of this handbook. The studies indicate that the control measures only achieved a 46% removal of sediment which flowed into them during storm events which caused measurable outflow. To achieve a more acceptable removal rate (60%), it was necessary to revise the design of these measures in this handbook. The total initial storage volume for both the sediment trap and the TEMPORARY SEDIMENT BASIN (Std. & Spec. 3.14) has been doubled. There are both a "wet" storage volume and a drawdown or "dry" storage volume which help to enhance sediment fall-out and prevent excessive sediment losses during large storm events which occur during the advanced stages of land disturbance (28).

In most cases excavation will be required to attain the necessary storage volume. Also, sediment must be periodically removed from the trap to maintain the required volume. Plans should detail how excavated sediment is to be disposed of, such as by use in fill areas on site or removal to an approved off-site location.

As noted previously in this handbook, there are numerous other acceptable ways to design many of the erosion control practices within. This is certainly true in the case of the sediment trap. However, variations in its design should be considered judiciously by plan reviewers to ensure that the minimum storage requirements and structural integrity noted in this specification are maintained.

Design Criteria

Trap Capacity

The sediment trap must have an initial storage volume of 134 cubic yards per acre of drainage area, half of which shall be in the form of a permanent pool or wet storage to provide a stable settling medium. The remaining half shall be in the form of a drawdown

or dry storage which will provide extended settling time during less frequent, larger storm events. The volume of the wet storage shall be measured from the low point of the excavated area to the base of the stone outlet structure. The volume of the dry storage shall be measured from the base of the stone outlet to the crest of the stone outlet (overflow mechanism). Sediment should be removed from the basin when the volume of the wet storage is reduced by one-half.

For a sediment trap, the wet storage volume may be approximated as follows:

$$V_1 = 0.85 \times A_1 \times D_1$$

where,

V_1 = the wet storage volume in cubic feet

A_1 = the surface area of the flooded area at the base of the stone outlet in square feet

D_1 = the maximum depth in feet, measured from the low point in the trap to the base of the stone outlet

The dry storage volume may be approximated as follows:

$$V_2 = \frac{A_1 + A_2}{2} \times D_2$$

where,

V_2 = the dry storage volume in cubic feet

A_1 = the surface area of the flooded area at the base of the stone outlet in square feet

A_2 = the surface area of the flooded area at the crest of the stone outlet (overflow mechanism), in square feet

D_2 = the depth in feet, measured from the base of the stone outlet to the crest of the stone outlet

The designer should seek to provide a storage area which has a minimum 2:1 length to width ratio (measured from point of maximum runoff introduction to outlet).

Note: Conversion between cubic feet and cubic yards is as follows:

number of cubic feet x 0.037 = number of cubic yards

Excavation

Side slopes of excavated areas should be no steeper than 1:1. The maximum depth of excavation within the wet storage area should be 4 feet to facilitate clean-out and for site safety considerations.

Outlet

The outlet for the sediment trap shall consist of a stone section of the embankment located at the low point in the basin. A combination of coarse aggregate and riprap shall be used to provide for filtering/detention as well as outlet stability. The smaller stone shall be VDOT #3, #357, or #5 Coarse Aggregate (smaller stone sizes will enhance filter efficiency) and riprap shall be "Class I." Filter cloth which meets the physical requirements noted in Std. & Spec. 3.19, RIPRAP shall be placed at the stone-soil interface to act as a "separator." The minimum length of the outlet shall be 6 feet times the number of acres comprising the total area draining to the trap. The crest of the stone outlet must be at least 1.0 foot below the top of the embankment to ensure that the flow will travel over the stone and not the embankment. The outlet shall be configured as noted in Plate 3.13-2.

Embankment Cross-Section

The maximum height of the sediment trap embankment shall be 5 feet as measured from the base of the stone outlet. Minimum top widths (W) and outlet heights (Ho) for various embankment heights (H) are shown in Plate 3.13-1. Side slopes of the embankment shall be 2:1 or flatter.

Removal

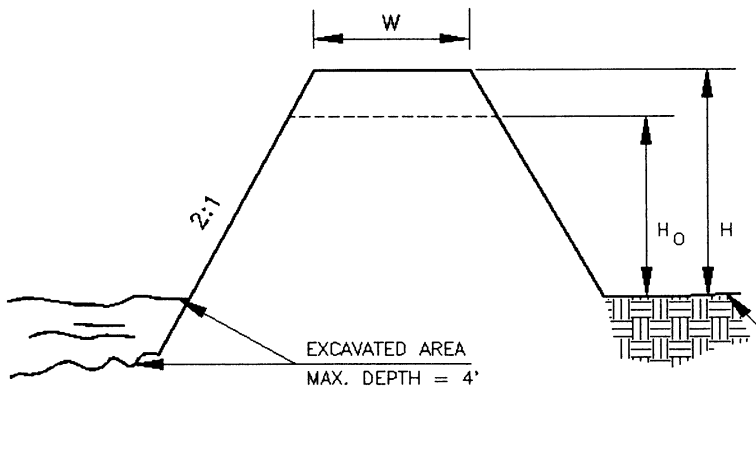
Sediment traps must be removed after the contributing drainage area is stabilized. Plans should show how the site of the sediment trap is to be graded and stabilized after removal.

Construction Specifications

1. The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and root mat.

2. Fill material for the embankment shall be free of roots or other woody vegetation, organic material, large stones, and other objectionable material. The embankment should be compacted in 6-inch layers by traversing with construction equipment.

MINIMUM TOP WIDTH (W) REQUIRED FOR SEDIMENT TRAP EMBANKMENTS ACCORDING TO HEIGHT OF EMBANKMENT (FEET)



H	H_O	W
1.5	0.5	2.0
2.0	1.0	2.0
2.5	1.5	2.5
3.0	2.0	2.5
3.5	2.5	3.0
4.0	3.0	3.0
4.5	3.5	4.0
5.0	4.0	4.5

Source: Va. DSWC

Plate 3.13-1

3. The earthen embankment shall be seeded with temporary or permanent vegetation (see Std. & Spec.'s 3.31 and 3.32) immediately after installation.

4. Construction operations shall be carried out in such a manner that erosion and water pollution are minimized.

5. The structure shall be removed and the area stabilized when the upslope drainage area has been stabilized.

6. All cut and fill slopes shall be 2:1 or flatter (except for excavated, wet storage area which may be at a maximum 1:1 grade).

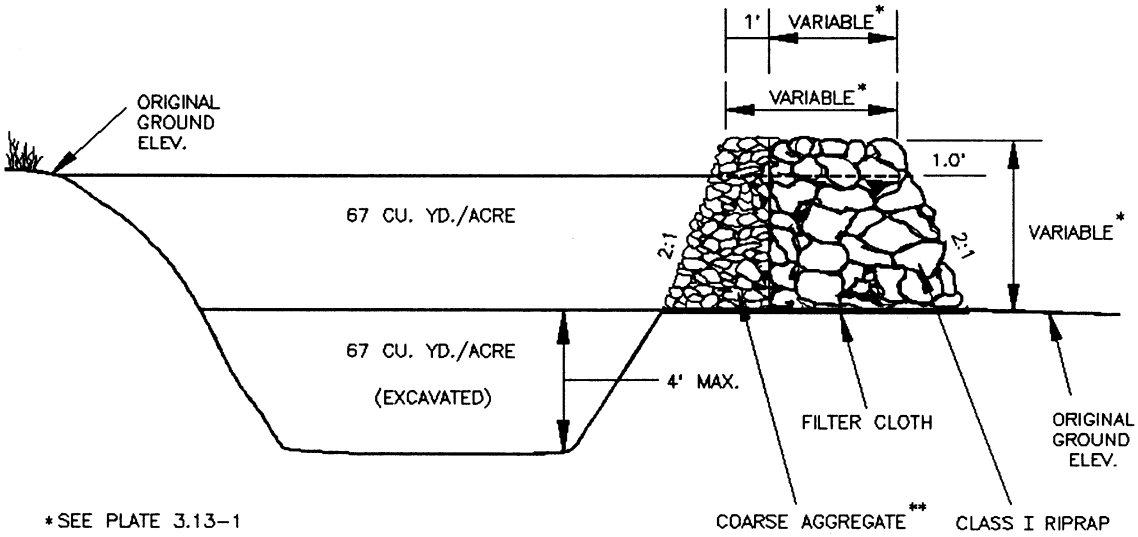
Maintenance

1. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Sediment removal from the basin shall be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

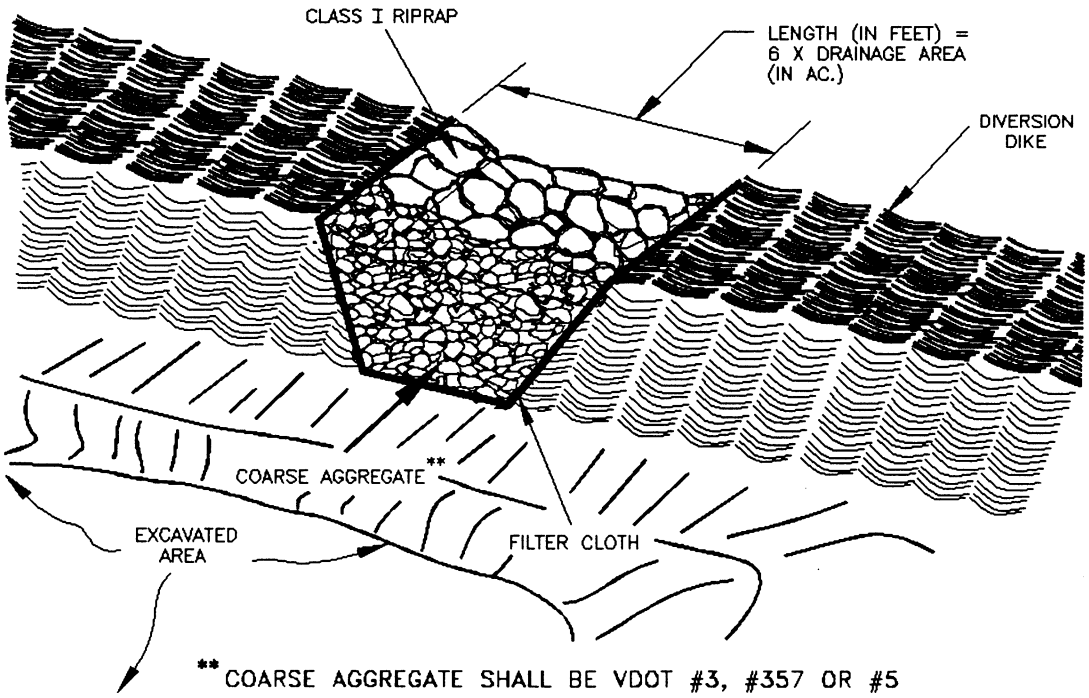
2. Filter stone shall be regularly checked to ensure that filtration performance is maintained. Stone choked with sediment shall be removed and cleaned or replaced.

3. The structure should be checked regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet should be checked to ensure that its center is at least 1 foot below the top of the embankment.

TEMPORARY SEDIMENT TRAP



CROSS SECTION OF OUTLET



OUTLET (PERSPECTIVE VIEW)

Source: Va. DSWC

Plate 3.13-2

Dust Control

STD & SPEC 3.39

DUST CONTROL

Definition

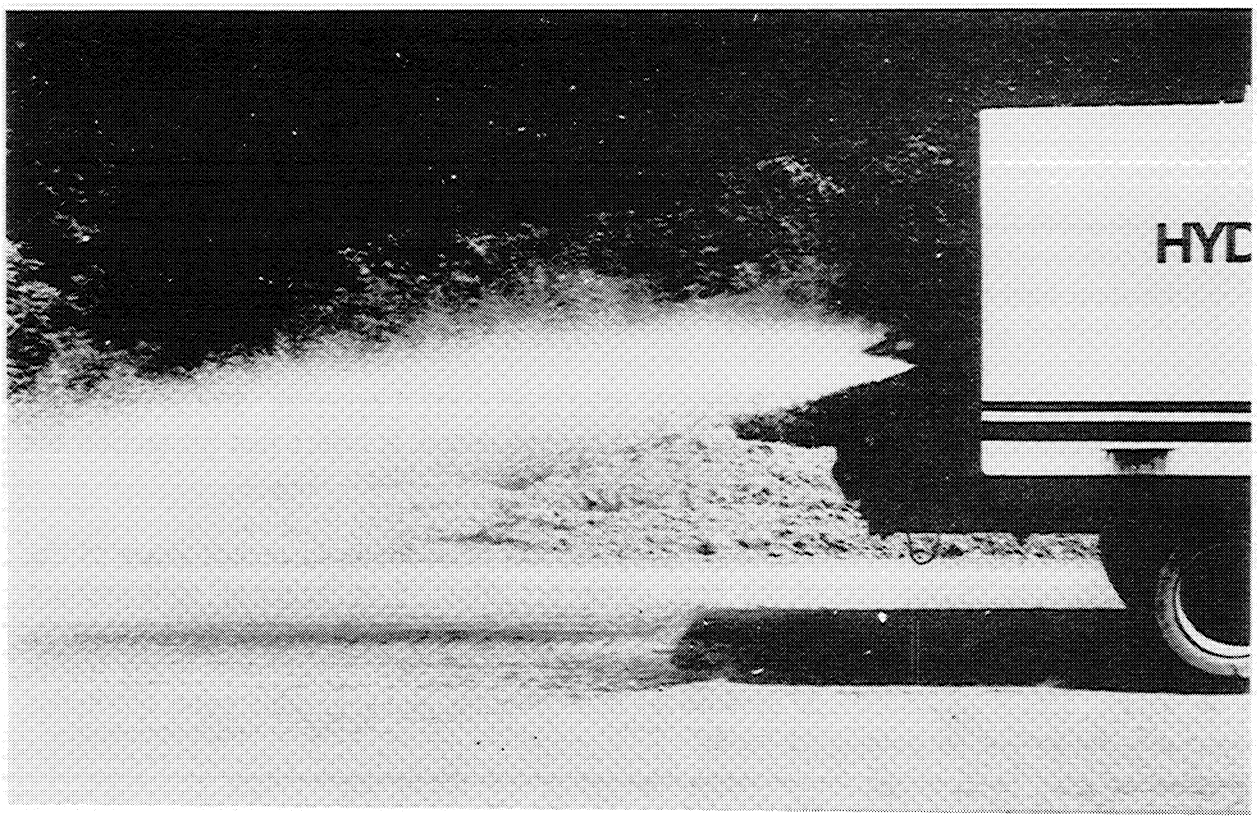
Reducing surface and air movement of dust during land disturbing, demolition and construction activities.

Purpose

To prevent surface and air movement of dust from exposed soil surfaces and reduce the presence of airborne substances which may present health hazards, traffic safety problems or harm animal or plant life.

Conditions Where Practice Applies

In areas subject to surface and air movement of dust where on-site and off-site damage is likely to occur if preventive measures are not taken.



Planning Considerations

Construction activities inevitably result in the exposure and disturbance of soil. Fugitive dust is emitted both during the activities (i.e., excavation, demolition, vehicle traffic, human activity) and as a result of wind erosion over the exposed earth surfaces. Large quantities of dust are typically generated in "heavy" construction activities, such as road and street construction and subdivision, commercial or industrial development, which involve disturbance of significant areas of the soil surface. Research of construction sites has established an average dust emission rate of 1.2 tons/acre/month for active construction. Earth-moving activities comprise the major source of construction dust emissions, but traffic and general disturbance of the soil also generate significant dust emissions.

In planning for dust control, limiting the amount of soil disturbance at any one time should be a key objective. Therefore, phased clearing and grading operations and the utilization of temporary stabilization in accordance with MS #1 can significantly reduce dust emissions. Undisturbed vegetative buffers (minimum 50-foot widths) left between graded areas and protected areas can also be very helpful in dust control.

Temporary Measures Used During Construction

1. Vegetative Cover - In areas subject to little or no construction traffic, a vegetatively stabilized surface will reduce dust emissions (see TEMPORARY SEEDING, Std. & Spec. 3.31).

2. Mulch - When properly applied, mulch offers a fast, effective means of controlling dust. Not recommended for areas within heavy traffic pathways. Binders or tackifiers should be used to tack organic mulches (see MULCHING, Std. & Spec. 3.35).

3. Tillage - This practice is designed to roughen and bring clods to the surface. It is an emergency measure which should be used before wind erosion starts. Begin plowing on windward side of site. Chisel-type plows spaced about 12 inches apart, spring-toothed harrows, and similar plows are examples of equipment which may produce the desired effect.

4. Irrigation - This is the most commonly used dust control practice. Site is sprinkled with water until the surface is wet. Repeat as needed. It offers fast protection for haul roads and other heavy traffic routes.

5. Spray-On Adhesives - Tremendous progress has been made in recent years in the development of products of this type. Most are effective on "mineral" soils and are ineffective on "muck" soils. These coherics are derived from a variety of compounds, both organic and synthetic based. Many of the adhesives will withstand heavy traffic loads. The organics include derivatives from pine tar and vegetable gum; synthetics may be acrylic or petroleum based.

The following table list various adhesives and provides corresponding information on mixing and application:

TABLE 3.39-A

ADHESIVES USED FOR DUST CONTROL

Adhesive	Water Dilution (Adhesive: Water)	Type of Nozzle	Application Rate Gallons/Acre
Anionic Asphalt Emulsion	7:1	Coarse Spray	1,200
Latex Emulsion	12.5:1	Fine Spray	235
Resin in Water	4:1	Fine Spray	300
Acrylic Emulsion (Non-Traffic)	7:1	Coarse Spray	450
Acrylic Emulsion (Traffic)	3.5:1	Coarse Spray	350

Source: Va. DSWC

6. Stone - Stone can be used to stabilize roads or other areas during construction using crushed stone or coarse gravel (see CONSTRUCTION ROAD STABILIZATION, Std. & Spec. 3.3).

7. Barriers - A board fence, wind fence, sediment fence, or similar barrier can help to control air currents and blowing soil. Place barriers perpendicular to prevailing air currents at intervals of about 15 times the barrier height. Where dust is a known problem, existing windbreak vegetation should be preserved.

8. Calcium Chloride - This chemical may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage. Application rates should be strictly in accordance with suppliers' specified rates.

Permanent Methods

1. Permanent Vegetation - The application of PERMANENT SEEDING (see Std. & Spec. 3.32) and saving existing trees and large shrubs can help reduce soil and air movement from construction sites.

2. Stone - Crushed stone or coarse gravel can be used as a permanent cover which will provide control of soil emissions.

Rip-Rap Placement

STD & SPEC 3.19

RIPRAP

RR

Definition

A permanent, erosion-resistant ground cover of large, loose, angular stone with filter fabric or granular underlining.

Purposes

1. To protect the soil from the erosive forces of concentrated runoff.

2. To slow the velocity of concentrated runoff while enhancing the potential for infiltration.

3. To stabilize slopes with seepage problems and/or non-cohesive soils.

Conditions Where Practice Applies

Wherever soil and water interface and the soil conditions, water turbulence and velocity, expected vegetative cover, etc., are such that the soil may erode under the design flow conditions. Riprap may be used, as appropriate, at stormdrain outlets, on channel banks and/or bottoms, roadside ditches, drop structures, at the toe of slopes, as transition from concrete channels to vegetated channels, etc.

Planning Considerations

Graded vs. Uniform Riprap

Riprap is classified as either graded or uniform. A sample of graded riprap would contain a mixture of stones which vary in size from small to large. A sample of uniform riprap would contain stones which are all fairly close in size.

For most applications, graded riprap is preferred to uniform riprap. Graded riprap forms a flexible self-healing cover, while uniform riprap is more rigid and cannot withstand movement of the stones. Graded riprap is cheaper to install, requiring only that the stones be dumped so that they remain in a well-graded mass. Hand or mechanical placement of individual stones is limited to that necessary to achieve the proper thickness and line. Uniform riprap requires placement in a more or less uniform pattern, requiring more hand or mechanical labor.

Riprap sizes can be designed by either the diameter or the weight of the stones. It is often misleading to think of riprap in terms of diameter, since the stones should be angular instead of spherical. However, it is simpler to specify the diameter of an equivalent size of spherical stone. Table 3.19-A lists some typical stones by weight, spherical diameter and the corresponding rectangular dimensions. These stone sizes are based upon an assumed specific weight of 165 lbs./ft^3.

Since graded riprap consists of a variety of stone sizes, a method is needed to specify the size range of the mixture of stone. This is done by specifying a diameter of stone in the mixture for which some percentage, by weight, will be smaller. For example, d_{85} refers to a mixture of stones in which 85% of the stone by weight would be smaller than the diameter specified. Most designs are based on d_{50}. In other words, the design is based on the average size of stone in the mixture. Table 3.19-B lists VDOT standard graded riprap sizes by diameter the weight of the stone.

To ensure that stone of substantial weight is used when implementing riprap structures, specified weight ranges for individual stones and composition requirements should be followed. Such guidelines will help to prevent inadequate stone from being used in construction of the measures and will promote more consistent stone classification statewide. Table 3.19-C notes these requirements.

TABLE 3.19-A

SIZE OF RIPRAP STONES

Weight (lbs.)	Mean Spherical Diameter (ft.)	Angular Shape: Length (ft.)	Angular Shape: Width, Height (ft.)
50	0.8	1.4	0.5
100	1.1	1.75	0.6
150	1.3	2.0	0.67
300	1.6	2.6	0.9
500	1.9	3.0	1.0
1,000	2.2	3.7	1.25
1,500	2.6	4.7	1.5
2,000	2.75	5.4	1.8
4,000	3.6	6.0	2.0
6,000	4.0	6.9	2.3
8,000	4.5	7.6	2.5
20,000	6.1	10.0	3.3

Source: VDOT Drainage Manual

Sequence of Construction

Since riprap is used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay. Disturbance of areas where riprap is to be placed should be undertaken only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.

Design Criteria

Gradation

The riprap shall be composed of a well-graded mixture down to the one-inch size particle such that 50% of the mixture by weight shall be larger than the d_{50} size as determined from the design procedure. A well-graded mixture as used herein is defined as a mixture composed primarily of the larger stone sizes but with a sufficient mixture of other sizes to fill the progressively smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1½ times the d_{50} size.

TABLE 3.19-B

GRADED RIPRAP - DESIGN VALUES

Riprap Class	D_{15} Weight (lbs.)	Mean D_{15} Spherical Diameter (ft.)	Mean D_{50} Spherical Diameter (ft.)
Class AI	25	0.7	0.9
Class I	50	0.8	1.1
Class II	150	1.3	1.6
Class III	500	1.9	2.2
Type I	1,500	2.6	2.8
Type II	6,000	4.0	4.5

Source: VDOT Drainage Manual

The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations actually available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of damage by children shall be considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the stones.

Thickness

The minimum thickness of the riprap layer shall be 2 times the maximum stone diameter, but not less than 6 inches.

Quality of Stone

Stone for riprap shall consist of field stone or rough unhewn quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended. The specific gravity of the individual stones shall be at least 2.5.

Rubble concrete may be used provided it has a density of at least 150 pounds per cubic foot, and otherwise meets the requirement of this standard and specification.

TABLE 3.19-C

GRADED RIPRAP - WEIGHT ANALYSIS

Riprap Class/Type	Weight Range* (lbs.)	Requirements for Stone Mixture
Class AI	25-75	Max. 10% > 75 lbs.
Class I	50-150	60% > 100 lbs.
Class II	150-500	50% > 300 lbs.
Class III	500-1,500	50% > 900 lbs.
Type I	1,500-4,000	Av. wt. = 2,000 lbs.
Type II	6,000-20,000	Av. wt. = 8,000 lbs.

* In all classes/types of riprap, a maximum 10% of the stone in the mixture may weigh less than the lower end of the range.

Source: Adapted from VDOT Road and Bridge Specifications

Filter Fabric Underlining

A lining of engineering filter fabric (geotextile) shall be placed between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. Table 3.19-D notes the minimum physical properties of the filter fabric.

Filter fabric shall not be used on slopes greater than 1½:1 as slippage may occur and should be used in conjunction with a layer of course aggregate (granular filter blanket is described below) when the riprap to be placed is Class II or larger.

Granular Filter

Although the filter cloth underlining or bedding is the preferred method of installation, a granular (stone) bedding is a viable option when the following relationship exists:

$$\frac{d_{15}\ filter}{d_{85}\ base} < 5 < \frac{d_{15}\ filter}{d_{15}\ base} < 40$$

and,

$$\frac{d_{50}\ filter}{d_{50}\ base} < 40$$

In these relationships, filter refers to the overlying material and base refers to the underlying material. The relationships must hold between the filter material and the base material and between the riprap and the filter material. In some cases, more than one layer of filter material may be needed. Each layer of filter material should be approximately 6-inches thick.

TABLE 3.19-D

REQUIREMENTS FOR FILTER FABRIC USED WITH RIPRAP

Physical Property	Test Method	Requirements
Equivalent Opening Size	Corps of Engineers CWO 2215-77	Equal or greater than U.S. No. 50 sieve
Tensile Strength* @ 20% (maximum)	VTM-52	30 lbs./linear in. (minimum)
Puncture Strength	ASTM D751*	80 lbs. (minimum)

* Tension testing machine with ring clamp, steel ball replaced with 5/16 diameter solid steel cylinder with hemispherical tip centered within the ring clamp.

Seams shall be equal in strength to basic material.

Additional fabric material or non-corrosive steel wire may be incorporated into the fabric to increase overall strength.

Source: VDOT Road and Bridge Specifications

Riprap at Outlets

Design criteria for sizing the stone and determining the dimensions of riprap pads used at the outlet of drainage structure are contained in OUTLET PROTECTION (Std. & Spec. 3.18). A filter fabric underlining is required for riprap used as outlet protection.

Riprap for Channel Stabilization

Riprap for channel stabilization shall be designed to be stable for the condition of bank-full flow in the reach of channel being stabilized. The design procedure in Appendix 3.19-a, which is extracted from the Federal Highway Administration's Design of Stable Channels with Flexible Linings (82), shall be used. This method establishes the stability of the rock material relative to the forces exerted upon it.

Riprap shall extend up the banks of the channel to a height equal to the maximum depth of flow or to a point where vegetation can be established to adequately protect the channel.

The riprap size to be used in a channel bend shall extend upstream from the point of curvature and downstream from the bottom of the channel to a minimum depth equal to the thickness of the blanket and shall extend across the bottom of the channel the same distance (see Plate 3.19-1).

Freeboard and Height of Bank

For riprapped and other lined channels, the height of channel lining above the water surface should be based on the size of the channel, the flow velocity, the curvature, inflows, wind action, flow regulation, etc.

The height of the bank above the water surface varies in a similar manner, depending on the above factors plus the type of soil.

Plate 3.19-2 is based on information developed by the U.S. Bureau of Reclamation for average freeboard and bank height in relation to channel capacity. This chart should be used by the designer to obtain a minimum freeboard for placement of riprap and top of bank.

Riprap for Slope Stabilization

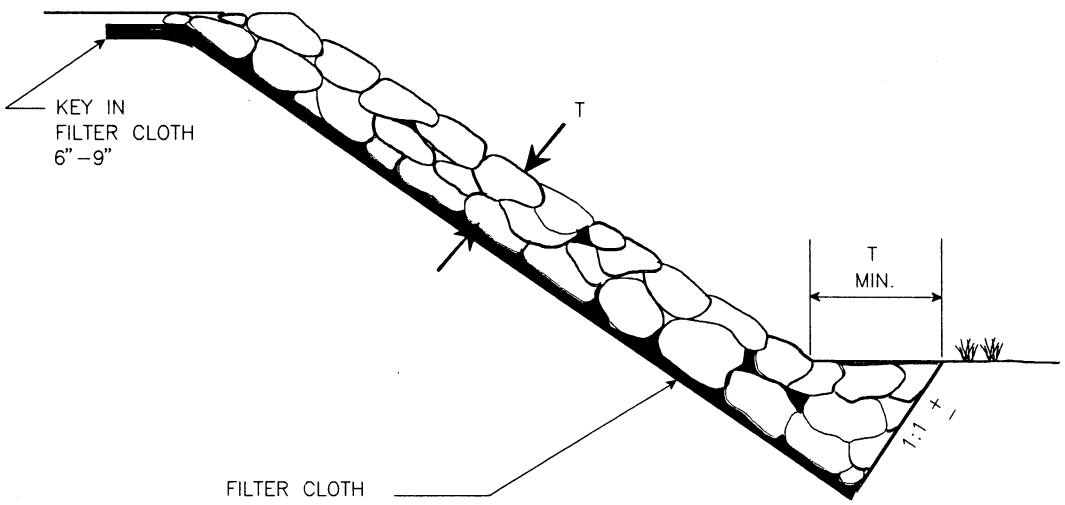
Riprap for slope stabilization shall be designed so that the natural angle of repose of the stone mixture is greater than the gradient of the slope being stabilized (see Plate 3.19-5).

Riprap for Lakes and Ponds Subject to Wave Action

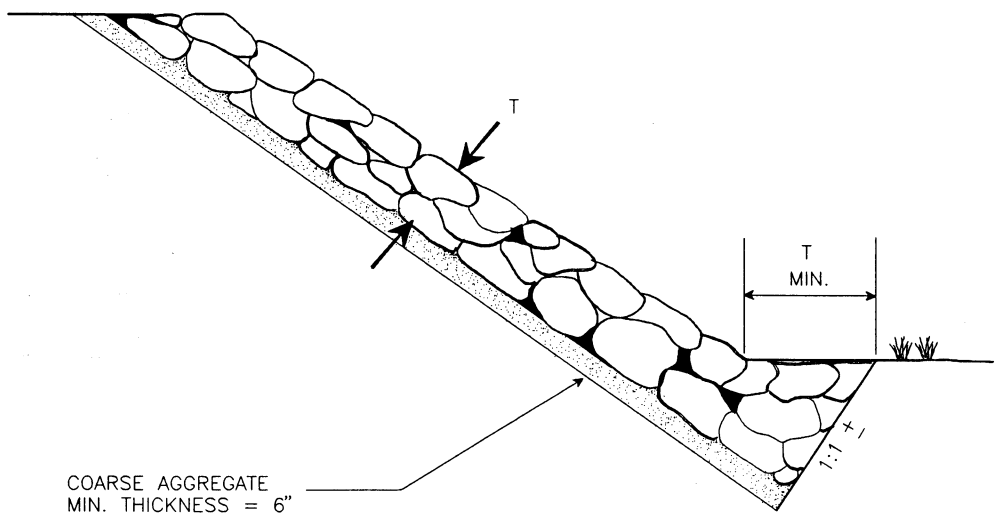
Riprap used for shoreline protection on lakes and ponds may be subject to wave action. The waves affecting the shoreline may be wind-driven or created by boat wakes. Consult

TOE REQUIREMENTS FOR BANK STABILIZATION

FILTER CLOTH UNDERLINER (PREFERRED)



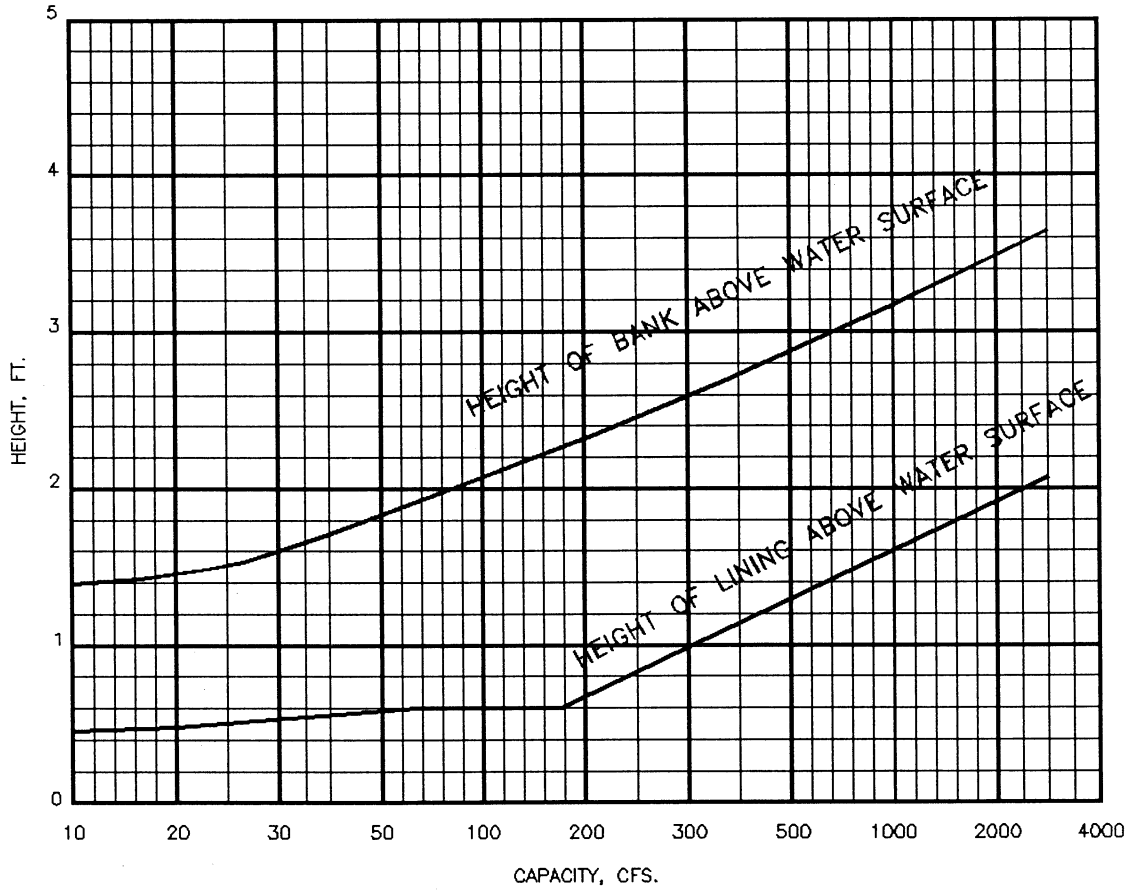
GRANULAR FILTER



Source: Adapted from VDOT Drainage Manual

Plate 3.19-1

RECOMMENDED FREEBOARD AND HEIGHT OF BANK OF LINED CHANNELS



Source: U. S. Bureau of Reclamation

Plate 3.19-2

the latest edition of the VDOT Drainage Manual ("Design of Slope Protection to Resist Wave Action") for specific design criteria in determining the required size of stones and the design wave height for such an installation. Use the equations in Appendix 3.19-b to calculate other pertinent design parameters. For more in-depth design criteria concerning these installations, see the U.S. Army Corps of Engineers' Shore Protection Manual (59).

Riprap for Abrupt Channel Contractions

Refer to latest edition of VDOT Drainage Manual.

Riprap for Installations Subject to Tidal and Wave Action

The design of riprap structures for tidal areas is beyond the scope of the VESCL and VESCR. The DSWC's Shoreline Programs Bureau provides advice regarding minimum design parameters for these installations. Notably, a riprap design for shoreline protection in tidal areas must meet all applicable state and federal requirements and should be carried out by a qualified professional.

Construction Specifications

Subgrade Preparation: The subgrade for the riprap or filter shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density approximately that of the surrounding undisturbed material. Brush, trees, stumps and other objectionable material shall be removed.

Filter Fabric or Granular Filter: Placement of the filter fabric should be done immediately after slope preparation. For granular filters, the stone should be spread in a uniform layer to the specified depth (normally 6 inches). Where more than one layer of filter material is used, the layer should be spread so that there is minimal mixing of the layers.

When installing geotextile filter cloths, the cloth should be placed directly on the prepared slope. The edges of the sheets should overlap by at least 12 inches. Anchor pins, 15 inches long, should be spaced every 3 feet along the overlap. The upper and lower ends of the cloth should be buried at least 12 inches. Care should be taken not to damage the cloth when placing the riprap. If damage occurs, that sheet should be removed and replaced. For large stone (Class II or greater), a 6-inch layer of granular filter will be necessary to prevent damage to the cloth.

Stone Placement: Placement of riprap should follow immediately after placement of the filter. The riprap should be placed so that it produces a dense well-graded mass of stone with a minimum of voids. The desired distribution of stones throughout the mass may be obtained by selective loading at the quarry, controlled dumping of successive loads during final placing, or by a combination of these methods. The riprap should be placed to its full thickness in one operation. The riprap should not be placed in layers. The riprap should not be placed by dumping into chutes or similar methods which are likely to cause

segregation of the various stone sizes. Care should be taken not to dislodge the underlying material when placing the stones.

The finished slope should be free of pockets of small stone or clusters of large stones. Hand placing may be necessary to achieve the required grades and a good distribution of stone sizes. Final thickness of the riprap blanket should be within plus or minus 1/4 of the specified thickness.

Maintenance

Once a riprap installation has been completed, it should require very little maintenance. It should, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or filter fabric or dislodged any of the stone. Care must be taken to properly control sediment-laden construction runoff which may drain to the point of the new installation. If repairs are needed, they should be accomplished immediately.

APPENDIX 3.19-a

RIPRAP DESIGN IN CHANNEL

The design method described below is adapted from Hydraulic Engineering Circular No. 15 of the Federal Highway Administration. It is applicable to both straight and curved sections of channel where the flow is tangent to the bank of the channel.

Tangent Flow - Federal Highway Administration Method

This design method determines a stable rock size for straight and curved sections of channels. It is assumed that the shape, depth of flow, and slope of the channel are known. A stone size is chosen for the maximum depth of flow. If the sides of the channel are steeper than 3:1, the stone size must be modified accordingly. The final design size will be stable on both sides of the channel and the bottom.

1. Enter Plate 3.19-3 with the maximum depth of flow (feet) and channel slope (feet/foot). Where the two lines intersect, choose the d_{50} size of stone. (Select the d_{50} for the diagonal line above the point of intersection).

2. If channel side slopes are steeper than 3:1, continue with step 3; if not, the procedure is complete.

3. Enter Plate 3.19-4 with the side slope and the base width to maximum depth ratio (B/d). Where the two lines intersect, move horizontally left to read K_1.

4. Determine from Plate 3.19-5 the angle of repose for the d_{50} size of stone and the side slope of the channel. (Use 42° for d_{50} greater than 1.0. Do not use riprap on slopes steeper than the angle of repose for the size of stone).

5. Enter Plate 3.19-6 with the side slope of the channel and the angle of repose for the d_{50} size of stone. Where the two lines intersect, move vertically down to read k_2.

6. Compute $d_{50} \times K_1/K_2 = d'_{50}$ to determine the correct size stone for the bottom and side slopes of straight sections of channel.

For Curved Sections of Channel

1. Compute the radius of the curve (Ro), measured at the outside edge of the bottom.

2. Compute the ratio of the top width of the water surface (Bs) to the radius of the curve (Ro), Bs/Ro.

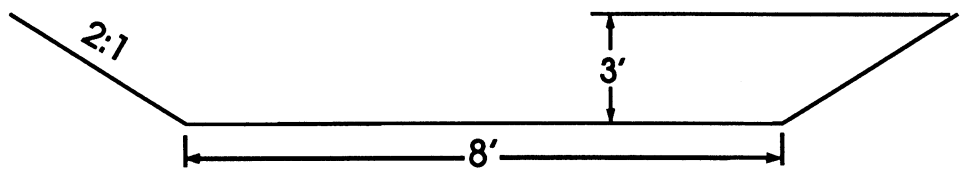
3. Enter Plate 3.19-7 with the radio Bs/Ro. Move vertically until the curve is intersected. Move horizontally left to read K_3.

4. Compute d'_{50} x K_3 = d_{50c} to determine the correct size stone for bottom and side slopes of the curved sections of channel.

Example Problem

Given:

A trapezoidal channel 3 feet deep, 8 foot bottom width, 2:1 side slopes, and a 2% slope.



Calculate:

A stable riprap size for the bottom and side slopes of the channel.

Solution:

1. From Plate 3.19-3, for a 3-foot-deep channel on a 2% grade, d_{50} = 0.75 feet or 9 inches.

2. Since the side slopes are steeper than 3:1, continue with step 3.

3. From Plate 3.19-4, B/d = 8/3 = 2.67, Z = 2, K_1 = 0.82.

4. From Plate 3.19-5, for d_{50} = 9 inches, = 41°.

5. From Plate 3.19-6, for Z = 2 and = 41°, K_2 = 0.73.

6. d_{50} x K_1/k_2 = d'_{50} = 0.75 x 0.82/0.73 = 0.84 feet.

$$0.84 \text{ feet} \times \frac{12 \text{ inches}}{1 \text{ foot}} = 10.08. \text{ Use } d'_{50} = 10 \text{ inches.}$$

Given:

The preceding channel has a curved section with a radius of 50 feet.

Calculate:

A stable riprap size for the bottom and side slopes of the curved section of channel.

Solution:

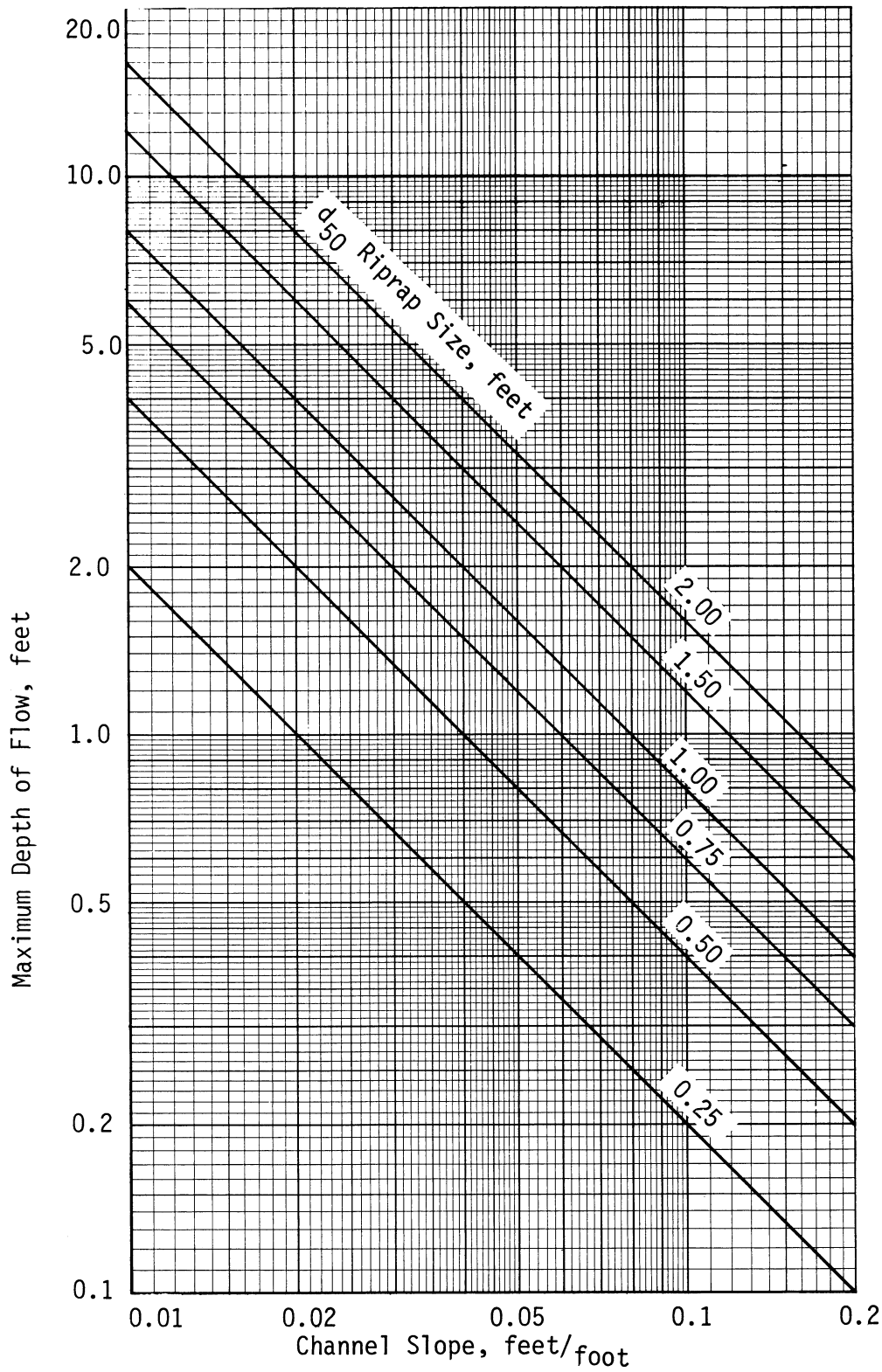
1. Ro = 50 feet

2. Bs/Ro = 20/50 = 0.40

3. From Plate 3.19-7, for Bs/Ro = 0.40, K_3 = 1.1

4. $d'_{50} \times K_3 = 0.84 \times 1.1 = 0.92$ feet

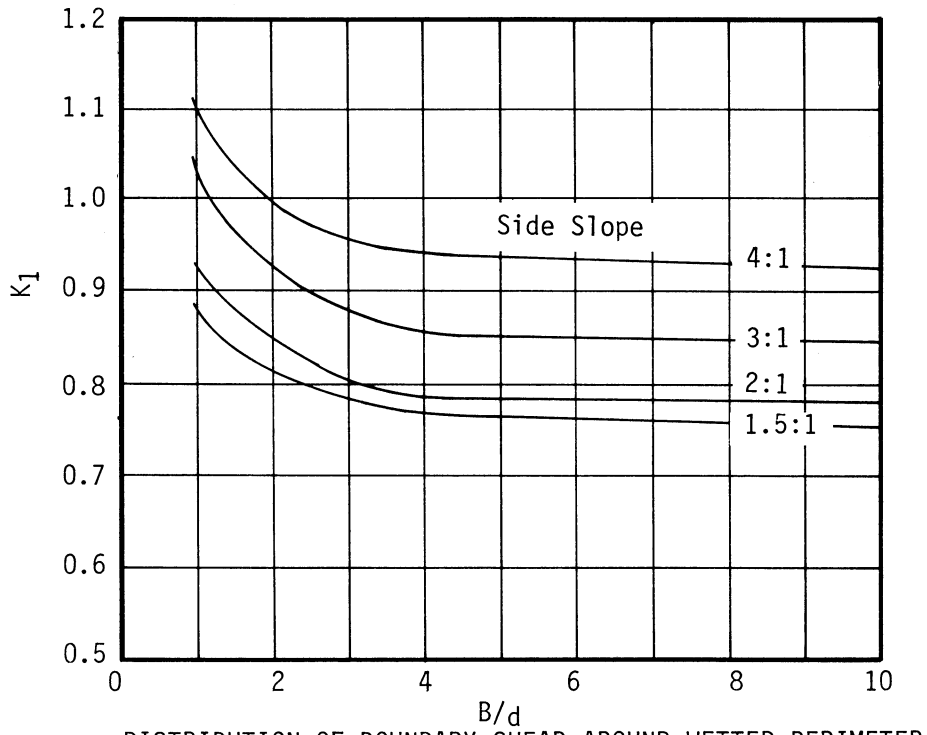
$$0.92 \text{ feet} \times \frac{12 \text{ inches}}{1 \text{ foot}} = 11.0.$$



MAXIMUM DEPTH OF FLOW FOR RIPRAP LINED CHANNELS

Source: VDOT Drainage Manual

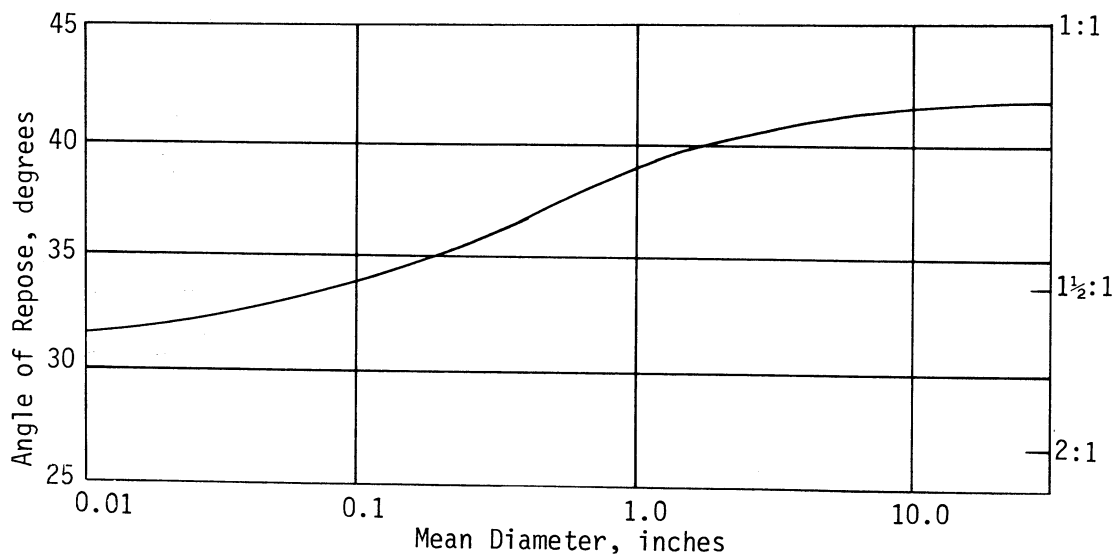
Plate 3.19-3



DISTRIBUTION OF BOUNDARY SHEAR AROUND WETTED PERIMETER OF TRAPEZOIDAL CHANNEL

Source: VDOT Drainage Manual

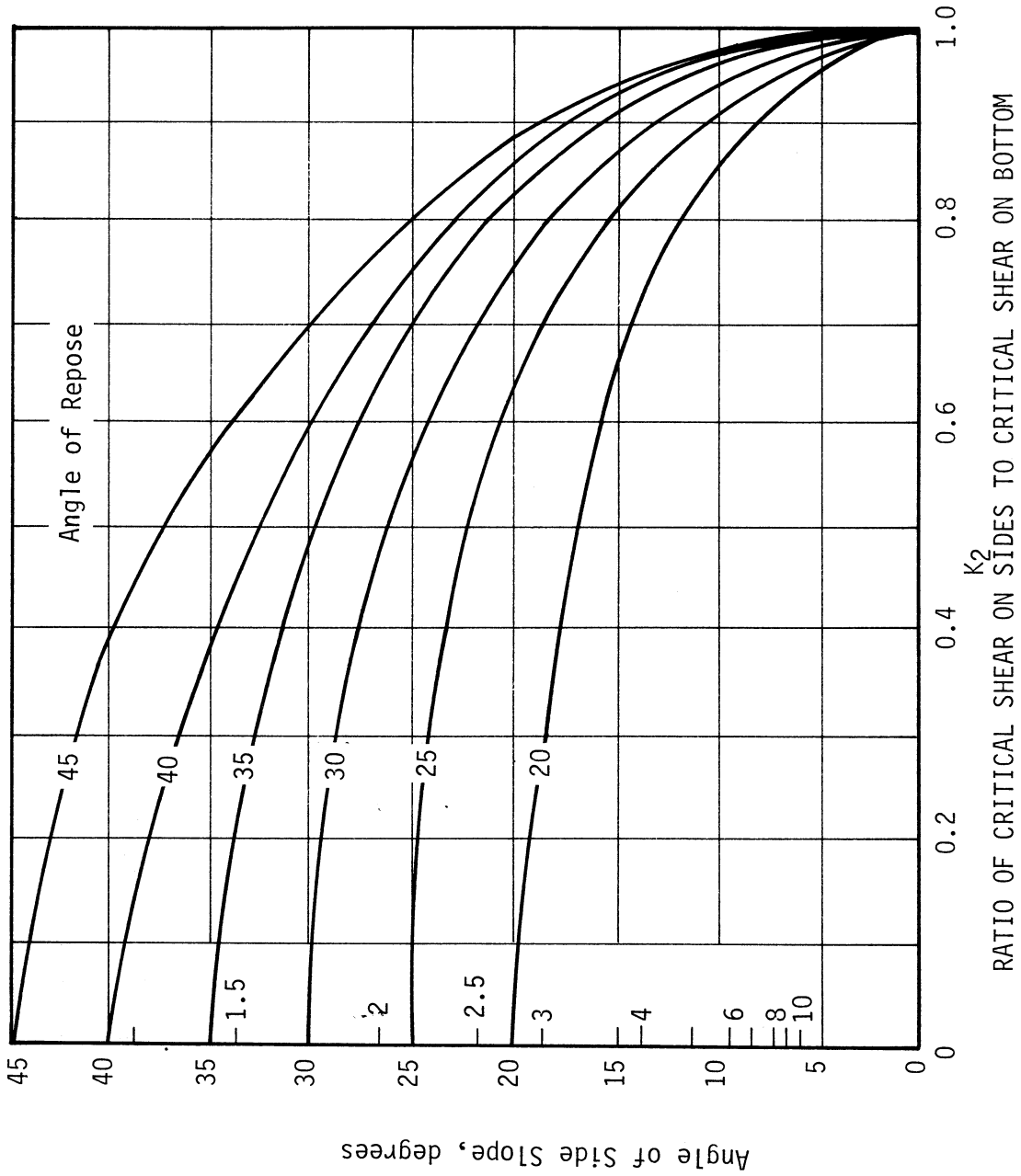
Plate 3.19-4



ANGLE OF REPOSE FOR RIPRAP STONES

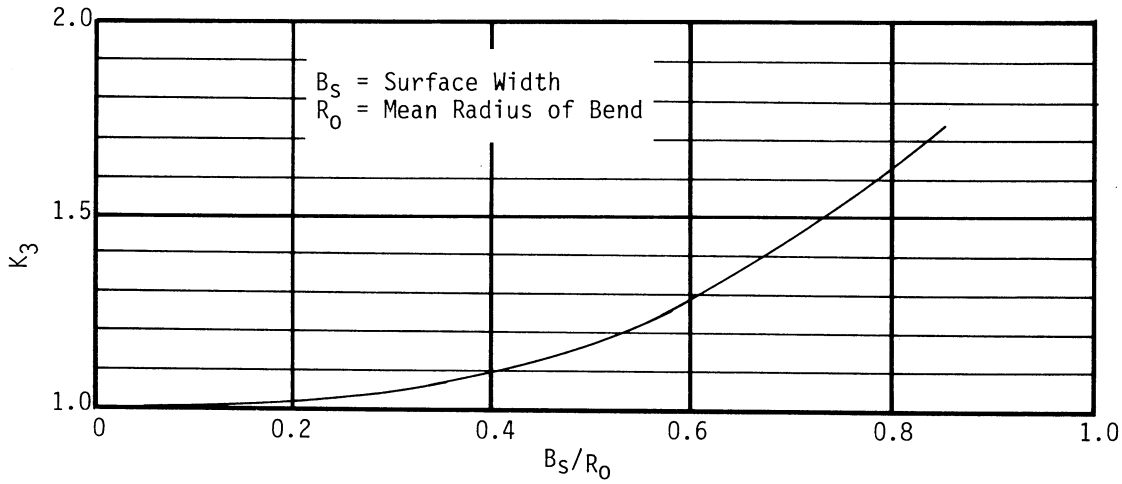
Source: VDOT Drainage Manual

Plate 3.19-5



Source: VDOT Drainage Manual

Plate 3.19-6



RATIO OF MAXIMUM BOUNDARY SHEAR IN BENDS TO MAXIMUM BOTTOM SHEAR IN STRAIGHT REACHES

Source: VDOT Drainage Manual

Plate 3.19-7

APPENDIX 3.19-b

RIPRAP DESIGN EQUATIONS FOR LAKES AND PONDS SUBJECT TO WAVE ACTION

In many instances, riprap is installed along the shoreline of nontidal ponds and lakes in order to protect them from the continual scour of wind-driven waves. The following methods/equations will produce minimum design parameters for size of stone, depth of buried toe (or width of riprap apron) and height of structure above average water level.

I. **Size of Riprap Required** - See VDOT Drainage Manual ("Design of Slope Protection to Resist Wave Action").

II. **DWH** (Design Wave Height) - See VDOT Drainage Manual ("Design of Slope Protection to Resist Wave Action") or U.S. Army Corps of Engineers' Shore Protection Manual.

III. **Depth of Buried Toe** = DWH at design wind speed.

IV. **Width of Riprap Apron** (Alternative to Buried Toe) = DWH x 2

V. **Height of Structure** (Above the Average Water Level) = DWH x 1.5

Temporary Seeding

STD & SPEC 3.31

TEMPORARY SEEDING

TS

Definition

The establishment of a temporary vegetative cover on disturbed areas by seeding with appropriate rapidly growing annual plants.

Purposes

1. To reduce erosion and sedimentation by stabilizing disturbed areas that will not be brought to final grade for a period of more than 30 days.

2. To reduce damage from sediment and runoff to downstream or off-site areas, and to provide protection to bare soils exposed during construction until permanent vegetation or other erosion control measures can be established.

Conditions Where Practice Applies

Where exposed soil surfaces are not to be fine-graded for periods longer than 30 days. Such areas include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, temporary roadbanks, etc. (see MS #1 and MS #2). A permanent vegetative cover shall be applied to areas that will be left dormant for a period of more than 1 year.

Planning Considerations

Sheet erosion, caused by the impact of rain on bare soil, is the source of most fine particles in sediment. To reduce this sediment load in runoff, the soil surface itself should be protected. The most efficient and economical means of controlling sheet and rill erosion is to establish vegetative cover. Annual plants which sprout rapidly and survive for only one growing season are suitable for establishing temporary vegetative cover. Temporary seeding is encouraged whenever possible to aid in "controlling" construction sites.

Temporary seeding also prevents costly maintenance operations on other erosion control systems. For example, sediment basin clean-outs will be reduced if the drainage area of the basin is seeded where grading and construction are not taking place. Perimeter dikes will be more effective if not choked with sediment.

Temporary seeding is essential to preserve the integrity of earthen structures used to control sediment, such as dikes, diversions, and the banks and dams of sediment basins.

Proper seedbed preparation and the use of quality seed are important in this practice just as in permanent seeding. Failure to carefully follow sound agronomic recommendations will often result in an inadequate stand of vegetation that provides little or no erosion control.

Specifications

Prior to seeding, install necessary erosion control practices such as dikes, waterways, and basins.

Plant Selection

Select plants appropriate to the season and site conditions from Tables 3.31-B and 3.31-C. Note that Table 3.31-B presents plants which can be used without extensive evaluation of site conditions; Table 3.31-C presents more in-depth information on the plant materials.

Seedbed Preparation

To control erosion on bare soil surfaces, plants must be able to germinate and grow. Seedbed preparation is essential.

1. Liming: An evaluation should be conducted to determine if lime is necessary for temporary seeding. In most soils, it takes up to 6 months for a pH adjustment to occur following the application of lime. Therefore, it may be difficult to justify the cost of liming a temporary site, especially when the soil will later be moved and regraded. The following table may be used to determine the actual need along with suggested application rates.

TABLE 3.31-A

LIMING REQUIREMENTS FOR TEMPORARY SITES

pH Test	Recommended Application of Agricultural Limestone
below 4.2	3 tons per acre
4.2 to 5.2	2 tons per acre
5.2 to 6	1 ton per acre

Source: Va. DSWC

2. Fertilizer: Shall be applied as 600 lbs./acre of 10-20-10 (14 lbs./1,000 sq. ft.) or equivalent nutrients. Lime and fertilizer shall be incorporated into the top 2 to 4 inches of the soil if possible.

3. Surface Roughening: If the area has been recently loosened or disturbed, no further roughening is required. When the area is compacted, crusted, or hardened, the soil surface shall be loosened by discing, raking, harrowing, or other acceptable means (see SURFACE ROUGHENING, Std. & Spec. 3.29).

4. Tracking: Tracking with bulldozer cleats is most effective on sandy soils. This practice often causes undue compaction of the soil surface, especially in clayey soils, and does not aid plant growth as effectively as other methods of surface roughening.

Seeding

Seed shall be evenly applied with a broadcast seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than 1½ inches deep. Small seeds, such as Kentucky Bluegrass, should be planted no more than 1/4 inch deep. Other Grasses and Legumes should be planted from 1/4 inch to 1/2 inch deep.

Mulching

1. Seedings made in fall for winter cover and during hot and dry summer months shall be mulched according to MULCHING, Std. & Spec. 3.35, except that hydromulches (fiber mulch) will not be considered adequate. Straw mulch should be used during these periods.

2. Temporary seedings made under favorable soil and site conditions during optimum spring and fall seeding dates may not require mulch.

Re-seeding

Areas which fail to establish vegetative cover adequate to prevent rill erosion will be re-seeded as soon as such areas are identified.

TABLE 3.31-B

ACCEPTABLE TEMPORARY SEEDING PLANT MATERIALS

"QUICK REFERENCE FOR ALL REGIONS"

Planting Dates	Species	Rate (lbs./acre)
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass (Lolium multi-florum) & Cereal (Winter) Rye (Secale cereale)	50 - 100
Feb. 16 - Apr. 30	Annual Ryegrass (Lolium multi-florum)	60 - 100
May 1 - Aug 31	German Millet (Setaria italica)	50

Source: Va. DSWC

TABLE 3.31-C

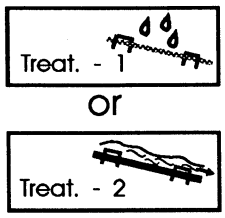
TEMPORARY SEEDING PLANT MATERIALS, SEEDING RATES, AND DATES

SPECIES	SEEDING RATE		NORTH[a]			SOUTH[b]			PLANT CHARACTERISTICS
	Acre	1000 ft^2	3/1 to 4/30	5/1 to 8/15	8/15 to 11/1	2/15 to 4/30	5/1 to 9/1	9/1 to 11/15	
OATS (Avena sativa)	3 bu. (up to 100 lbs., not less than 50 lbs.)	2 lbs.	X	-	-	X	-	-	Use spring varieties (e.g., Noble).
RYE[d] (Secale cereale)	2 bu. (up to 110 lbs., not less than 50 lbs.)	2.5 lbs.	X	-	X	X	-	X	Use for late fall seedings, winter cover. Tolerates cold and low moisture.
GERMAN MILLET (Setaria italica)	50 lbs.	approx. 1 lb.	-	X	-	-	X	-	Warm-season annual. Dies at first frost. May be added to summer mixes.
ANNUAL RYEGRASS[c] (Lolium multi-florum)	60 lbs.	1½ lbs.	X	-	X	X	-	X	May be added in mixes. Will mow out of most stands.
WEEPING LOVEGRASS (Eragrostis curvula)	15 lbs.	5½ ozs.	-	X	-	-	X	-	Warm-season perennial. May bunch. Tolerates hot, dry slopes and acid, infertile soils. May be added to mixes.
KOREAN LESPEDEZA[c] (Lespedeza stipulacea)	25 lbs.	approx. 1½ lbs.	X	X	-	X	X	-	Warm season annual legume. Tolerates acid soils. May be added to mixes.

[a] Northern Piedmont and Mountain region. See Plates 3.22-1 and 3.22-2.
[b] Southern Piedmont and Coastal Plain.
[c] May be used as a cover crop with spring seeding.
[d] May be used as a cover crop with fall seeding.
X May be planted between these dates.
\- May not be planted between these dates.

Soil Stabilization Blankets & Matting

STD & SPEC 3.36



SOIL STABILIZATION BLANKETS & MATTING

B/M

Definition

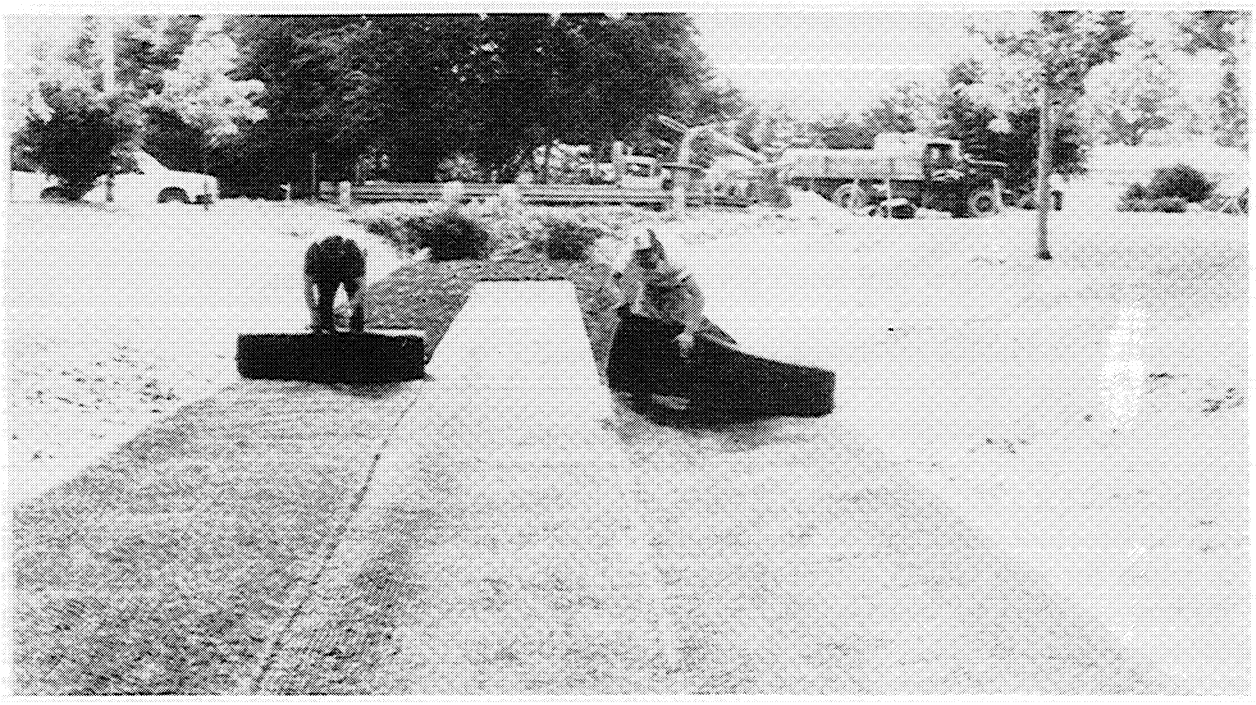
The installation of a protective covering (blanket) or a soil stabilization mat on a prepared planting area of a steep slope, channel or shoreline.

Purpose

To aid in controlling erosion on critical areas by providing a microclimate which protects young vegetation and promotes its establishment. In addition, some types of soil stabilization mats are also used to raise the maximum permissible velocity of turf grass stands in channelized areas by "reinforcing the turf" to resist the forces of erosion during storm events.

Conditions Where Practice Applies

On short, steep slopes where erosion hazard is high and planting is likely to be too slow in providing adequate protective cover; in vegetated channels where the velocity of design flow exceeds "allowable" velocity; on streambanks or tidal shorelines where moving water is likely to wash out new plantings; or in areas where the forces of wind prevent standard mulching practices from remaining in place until vegetation becomes established.



Planning Considerations

Soil stabilization blankets and mats can be applied to problem areas to supplement nature's erosion control system (vegetation) in its initial establishment and in providing a safe and "natural" conveyance for high velocity stormwater runoff. They are being used today in many applications were previously a structural lining would have been required. Care must be taken to choose the type of blanket or matting which is most appropriate for the specific needs of a project. Two general types of blankets and mats are discussed within this specification. However, with the abundance of soil stabilization products available today, it is impossible to cover all the advantages, disadvantages and specifications of all manufactured blankets and mats. Therefore, as with many erosion control-type products, there is no substitute for a thorough understanding of the manufacturer's instructions and recommendations and a site visit by a designer or plan reviewer to verify a product's appropriateness.

Treatment-1 is a degradable soil stabilization blanket which includes "combination" blankets consisting of a plastic netting which covers and is intertwined with a natural organic or man-made mulch; or, a jute mesh which is typically homogeneous in design and can act alone as a soil stabilization blanket.

It should be used to help establish vegetation on previously disturbed slopes - normally problem slopes of 3:1 or greater. Since the materials which compose the soil stabilization blankets will deteriorate over time, they should be used in permanent conveyance channels with the realization that the system's resistance to erosion is based on the type of vegetation planted and the existing soil characteristics. During the establishment of vegetation, **Treatment-1** should not be subjected to shallow or deep concentrated flows moving at greater than 4 feet/second.

Treatment-1 provides the following benefits in the achievement of vegetative stabilization when properly applied over seed and required amendments:

1. Protection of the seed and soil from raindrop impact and subsequent displacement.

2. Thermal consistency and moisture retention for seedbed area.

3. Stronger and faster germination of grasses and legumes.

4. Planing off excess stormwater runoff.

5. Prevention of sloughing of topsoil added to steeper slopes.

Treatment-2 is a soil stabilization matting which consists of a non-degradable, 3-dimensional plastic structure which can be filled with soil prior to planting. This configuration provides a matrix for root growth where the matting becomes entangled and penetrated by roots, forming continuous anchorage for surface growth and promoting enhanced energy

dissipation. **Treatment-2** can be used on problem slopes (normally 3:1 or greater), and in stormwater conveyance channels.

In addition to those benefits noted for **Treatment-1**, **Treatment-2** provides the following benefits in the achievement of vegetative stabilization and in the replacement of more traditional channel linings such as concrete and riprap:

1. Causes soil to drop out of stormwater and fill matrix with fine soils which become the growth medium for the development of roots.

2. When embedded in the soil within stormwater channels, it acts with the vegetative root system to form an erosion resistant cover which resists hydraulic lift and shear forces.

Since **Treatment-2** is non-degradable, it can be used in permanent conveyance channels and can withstand higher velocities of flow than the vegetation and soil would normally allow. However, a 10 feet/second velocity of flow should be the maximum allowed in a conveyance system which utilizes **Treatment-2**.

VDOT Nomenclature and Product Information

The Virginia Department of Transportation has its own nomenclature for many of the standards and specifications found in this handbook; this is true in the case of soil stabilization blankets and matting. The following relationship exists between the two methods of naming the practice:

Va. E&S-C Handbook		VDOT Specifications
Treatment-1	(is equivalent to)	EC-2
Treatment-2	(is equivalent to)	EC-3

It is recommended that most current VDOT "Approved Products List" for these products be consulted prior to installation of a particular blanket or mat. Importantly, the list names those products approved for a certain range of flow velocities when **Treatment-2** (VDOT's EC-3) installation is contemplated.

TREATMENT-1: SOIL STABILIZATION BLANKET

(Allowable Velocity Range During Vegetation Establishment: 0 - 4 f.p.s.)

Materials

1. Combination Blankets - They shall consist of a photo-degradable plastic netting which covers and is entwined in a natural organic or man-made mulching material.

The mulching material shall consist of wood fibers, wood excelsior, straw, coconut fiber, or man-made fibers, or a combination of the same. The blanket shall be of consistent thickness with the mulching material/fibers evenly distributed over its entire length. The mulching material/fibers must interlock or entwine to form a dense layer which not only resists raindrop impact, but will allow vegetation to penetrate the blanket.

The blanket shall be nontoxic to vegetation and to the germination of seed and shall not be injurious to the unprotected skin of humans. At a minimum, the plastic netting must cover the top side of the blanket and possess a high web strength. The netting shall be entwined with the mulching material/fiber to maximize strength and provide for ease of handling.

2. Jute Mesh - It shall be of a uniform, open, plain weave, of undyed and unbleached single jute yarn. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than one half of its normal diameter. Jute mesh shall be new and shall conform to the following:

   a. Length of jute mesh shall be marked on each roll.

   b. There shall be 0.60-inch openings (± 25%) between strands, lengthwise.

   c. There shall be 0.90-inch openings (± 25%) between strands, lengthwise.

   d. Weight shall average 0.90 lbs./square yard with a tolerance of 5%.

   As previously noted, jute mesh provides such good coverage (large surface area of strands) and contains such small openings that it can be used alone as a blanket.

3. Other **Treatment-1** Products - These shall conform to manufacturer's specifications and be approved by the Plan-Approving Authority prior to being specified for a particular application. These products should be installed in accordance with manufacturer's recommendations, provided those recommendations are at least as stringent as this specification. Again, it is recommended that VDOT's "Approved Products List" be consulted. In no case shall these products cover less than 30% of the soil surface.

4. Staples - Staples for anchoring Treatment-1 shall be No. 11-gauge wire or heavier. Their length shall be a minimum of 6 inches. A larger staple with a length of up to 12 inches should be used on loose, sandy, or unstable soils.

Installation Requirements

Site Preparation - After site has been shaped and graded to approved design, prepare a friable seedbed relatively free from clods and rocks more than 1½ inches in diameter and any foreign material that will prevent uniform contact of the protective covering with the soil surface.

Planting - Lime, fertilize, and seed in accordance with seeding or other type of planting plan. When using jute mesh on a seeded area, apply approximately one-half the seed after laying the mat. The protective covering can be laid over sprigged areas where small grass plants have been inserted into the soil. Where ground covers are to be planted, lay the protective covering first and then plant through the material as per planting design.

When open-weave nets are used, lime, fertilizer, seed and mulch should be applied before laying the net. When a combination blanket (such as an "excelsior" blanket) is used, seed and soil amendments must also be applied before the blanket is laid.

Orientation - See Plate 3.36-1 for orientation of **Treatment-1** for different topographic conditions.

Laying and Stapling (see Plate 3.36-2) - If instructions have been followed, all needed check slots will have been installed, and the protective covering will be laid on a friable seedbed free from clods, rocks, roots, etc. that might impede good contact.

1. Start laying the protective covering from the top of the channel or top of slope and unroll down-grade.

2. Allow to lay loosely on soil - do not stretch.

3. Upslope ends of the protective covering should be buried in a anchor slot no less than 6-inches deep. Tamp earth firmly over the material. Staple the material at a minimum of every 12 inches across the top end.

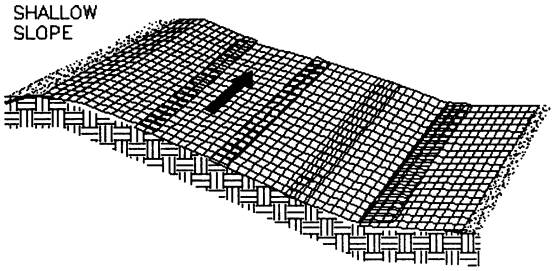
4. Edges of the material shall be stapled every 3 feet. Where multiple widths are laid side by side, the adjacent edges shall be overlapped a minimum of 2 inches and stapled together.

5. Staples shall be placed down the center, staggered with the edges at 3 foot intervals.

Check slots - On highly erodible soils and on slopes steeper than 4:1, erosion check slots should be made every 50 feet (see Plate 3.36-2). Insert a fold of the material (separate piece) into a 6-inch trench and tamp firmly. Staple fold to "main" blanket at minimum 12-inch intervals across the upstream and downstream portion of the blanket.

TYPICAL ORIENTATION OF TREATMENT – 1 (SOIL STABILIZATION BLANKET)

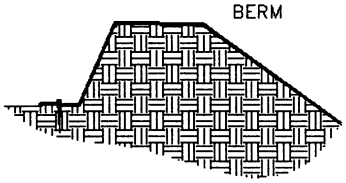
SHALLOW SLOPE



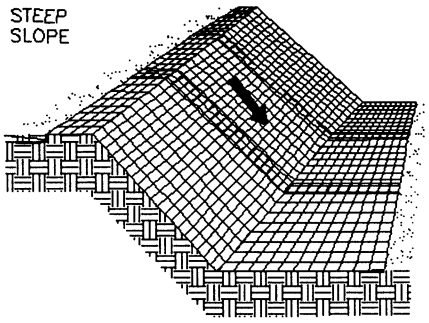
ON SHALLOW SLOPES, STRIPS OF NETTING PROTECTIVE COVERINGS MAY BE APPLIED ACROSS THE SLOPE.

WHERE THERE IS A BERM AT THE TOP OF THE SLOPE, BRING THE MATERIAL OVER THE BERM AND ANCHOR IT BEHIND THE BERM.

BERM

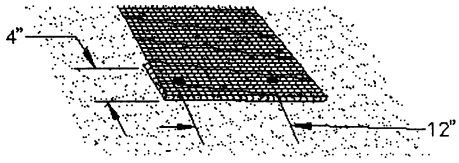


STEEP SLOPE

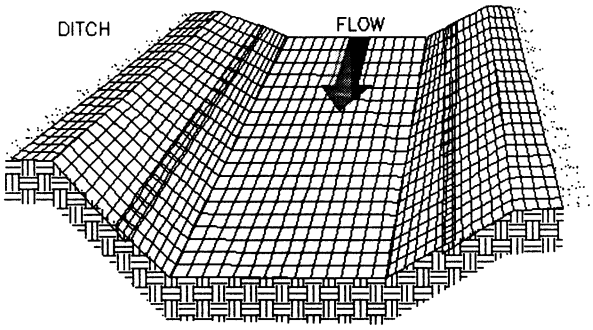


ON STEEP SLOPES, APPLY PROTECTIVE COVERING PARALLEL TO THE DIRECTION OF FLOW AND ANCHOR SECURELY.

BRING MATERIAL DOWN TO A LEVEL AREA BEFORE TERMINATING THE INSTALLATION. TURN THE END UNDER 4" AND STAPLE AT 12" INTERVALS.



DITCH

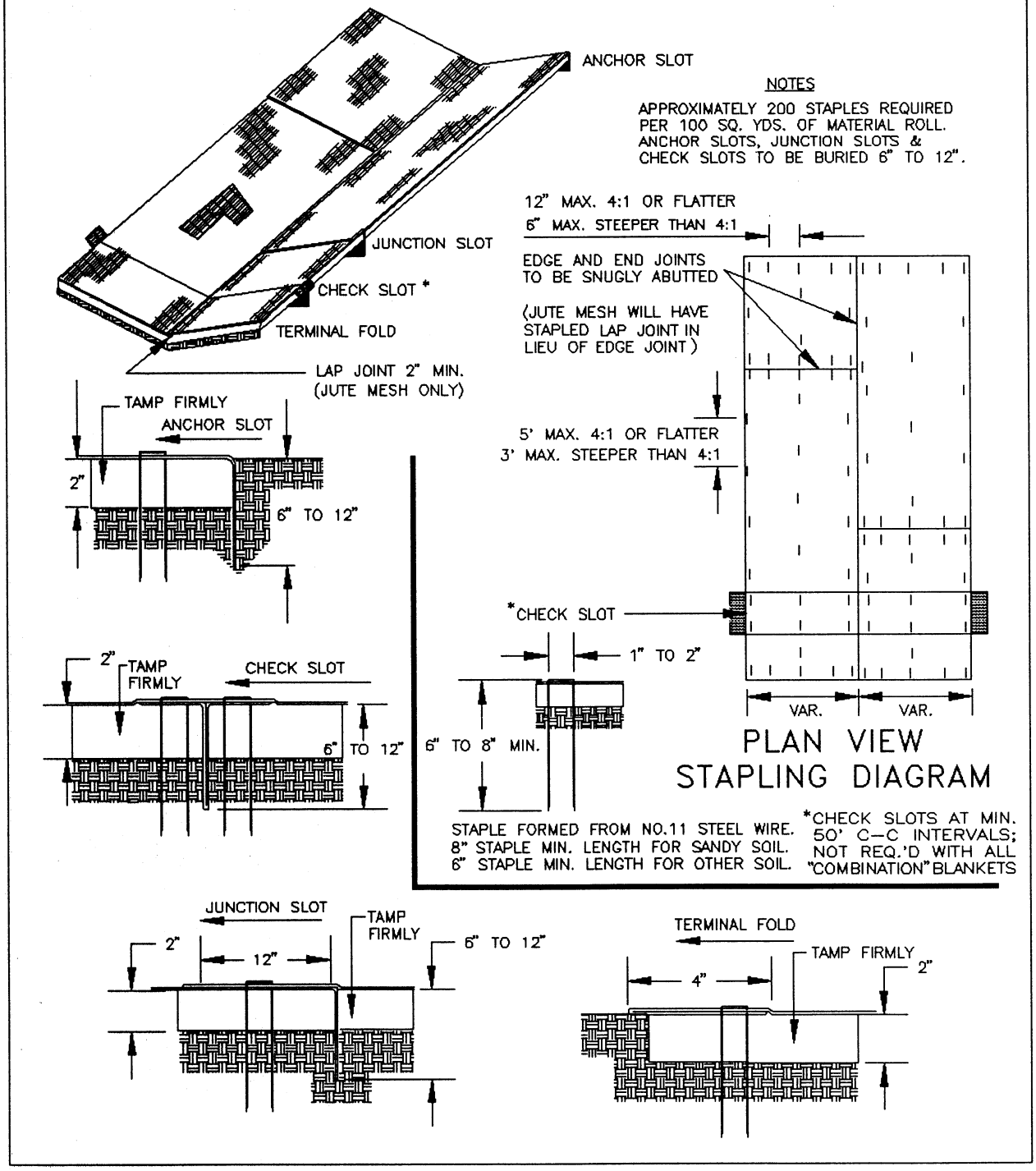


IN DITCHES, APPLY PROTECTIVE COVERING PARALLEL TO THE DIRECTION OF FLOW. USE CHECK SLOTS AS REQUIRED. AVOID JOINING MATERIAL IN THE CENTER OF THE DITCH IF AT ALL POSSIBLE.

Source: Adapted from Ludlow Products Brochure

Plate 3.36-1

TYPICAL TREATMENT – 1 (SOIL STABILIZATION BLANKET) INSTALLATION CRITERIA



Source: VDOT Road and Bridge Standards

Plate 3.36-2

Note: Many combination blankets are designed and manufactured to resist movement and uplift to a point which check slots may not be required. Plan designers and review authorities are urged to study manufacturers' recommendations and site conditions.

Joining Protective Coverings - Insert a new roll of material into an anchor slot, as with upslope ends. Overlap the end of the previous roll a minimum of 12 inches, and staple across the end of the roll just below the anchor slot and across the material every 12 inches.

Terminal End - At the point at which the material is discontinued, or at which time the protective covering meets a structure of some type, fold 4 inches of the material underneath and staple every 12 inches (minimum).

At bottom of slopes - Lead net out onto a level area before anchoring. Turn ends under 4 inches, and staple across end every 12 inches.

Final Check - These installation techniques must be adhered to:

1. Protective blanket is in uniform contact with the soil.
2. All lap joints are secure.
3. All staples are driven flush with the ground.
4. All disturbed areas have been seeded.

TREATMENT-2: SOIL STABILIZATION MATTING

(Allowable velocity range after vegetative establishment: 0 - 10 f.p.s.)

Materials

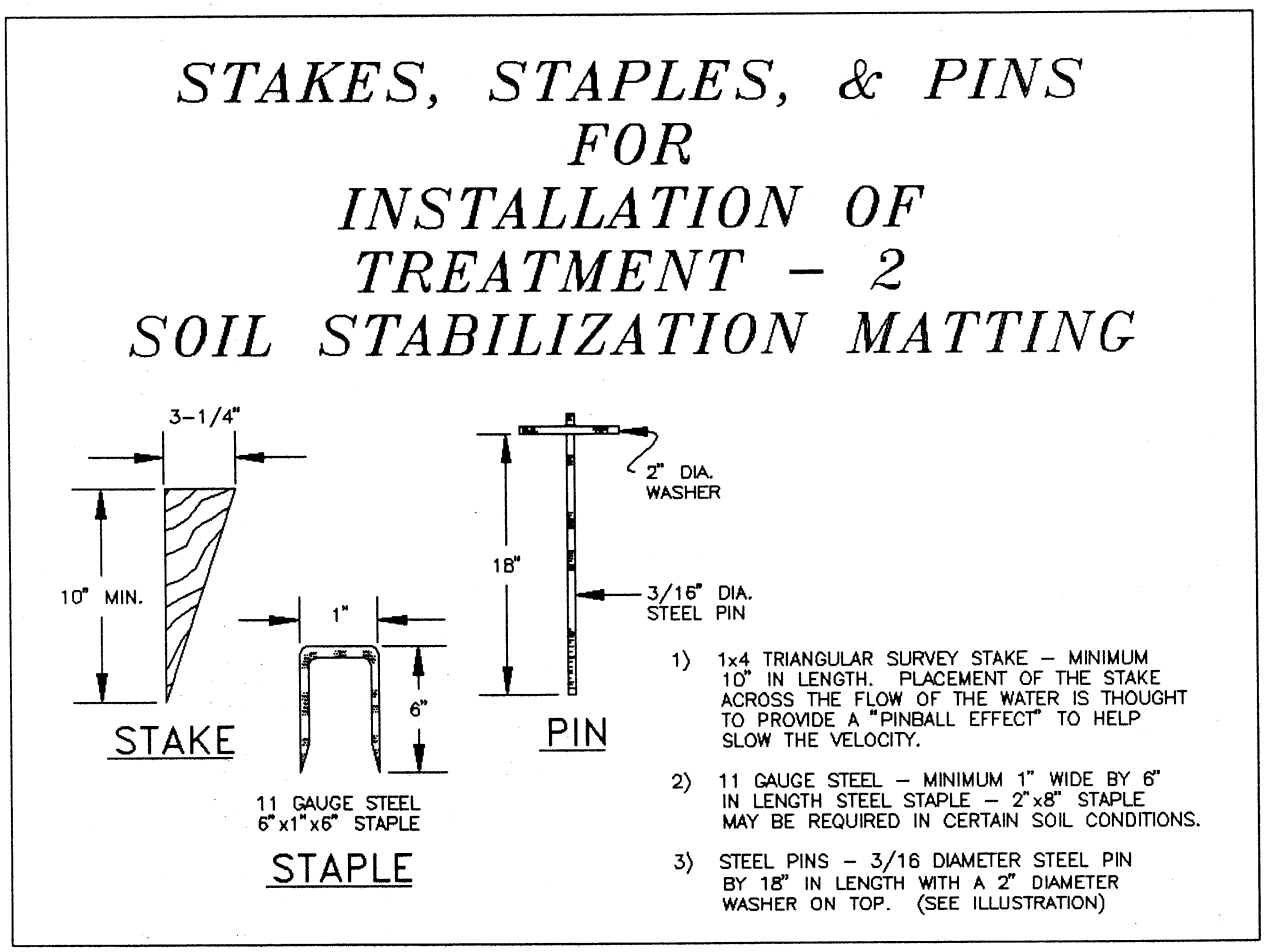
Matting - The majority of these products provide a three dimensional geomatrix of nylon, polyethylene, or randomly oriented monofilaments, forming a mat. These products contain ultra violet (UV) inhibiting stabilizers, added to the compounds to ensure endurance and provide "permanent root reinforcement."

The three dimensional feature creates an open space which is allowed to fill with soil. The roots of the grass plant become established within the mat itself, forming a synergistic root and mat system. As the grass becomes established, the two actually "reinforce" each other, preventing movement or damage to the soil. Allowable velocities are increased considerably over natural turf stands.

Selection of the appropriate matting materials along with proper installation become critical factors in the success of this practice. VDOT's "Approved Products List" can be a real asset in the selection process. Consultation with the supplier or the manufacturer and thorough

evaluation of performance data to ensure proper selection of a soil stabilization matting are also essential. Although many manufacturers claim their products may inhibit erosion associated with channel velocities of up to 20 ft./sec., it is recommended that any velocities that exceed 10 ft./sec. be properly protected with some form of structural lining (see Std. & Spec. 3.17, STORMWATER CONVEYANCE CHANNEL).

Staples - Staples or anchoring methods and recommendations vary by manufacturers. The expectation of high velocities should dictate the use of more substantial anchoring. Some of the typically recommended stakes, staples and pins are depicted in Plate 3.36-3



Source: Product literature from Greenstreak, Inc. Plate 3.36-3

Installation Requirements

Site Preparation - After site has been shaped and graded to approved design, prepare a friable seedbed relatively free from clods and rocks more than 1 inch in diameter, and any foreign material that will prevent contact of the soil stabilization mat with the soil surface. If necessary, redirect any runoff away from the ditch or slope during installation.

Planting - Lime, fertilize and seed in accordance with MS #1 and the approved plan, paying special attention to the plant selection that may have been chosen for the matted area. If the area has been seeded prior to installing the mat, make sure and reseed all areas disturbed during installation.

Mulching - Mulch (normally straw) should be applied following installation of **Treatment-2** at rates noted in Std. & Spec. 3.35, MULCHING.

Laying and Securing - See Plates 3.36-4, 3.36-5 and 3.36-6. Similar to installing **Treatment-1**, but Plan Approving Authority's requirements or manufacturer's recommendations must be followed as detailed. The key to achieving desired performance is dependent upon proper installation.

Check Slots - See Plate 3.36-4. Matting manufacturers vary significantly in their check slot requirements. Similar to the installation of **Treatment-1**, a check slot may be required when laying **Treatment-2** to "correct" the flow of water if it has the potential to undermine the matting. Most authorities (including VDOT) require that the sides of the matting also be entrenched, creating a slope shelf for the material to rest on, preventing water from entering under the mat on the sides.

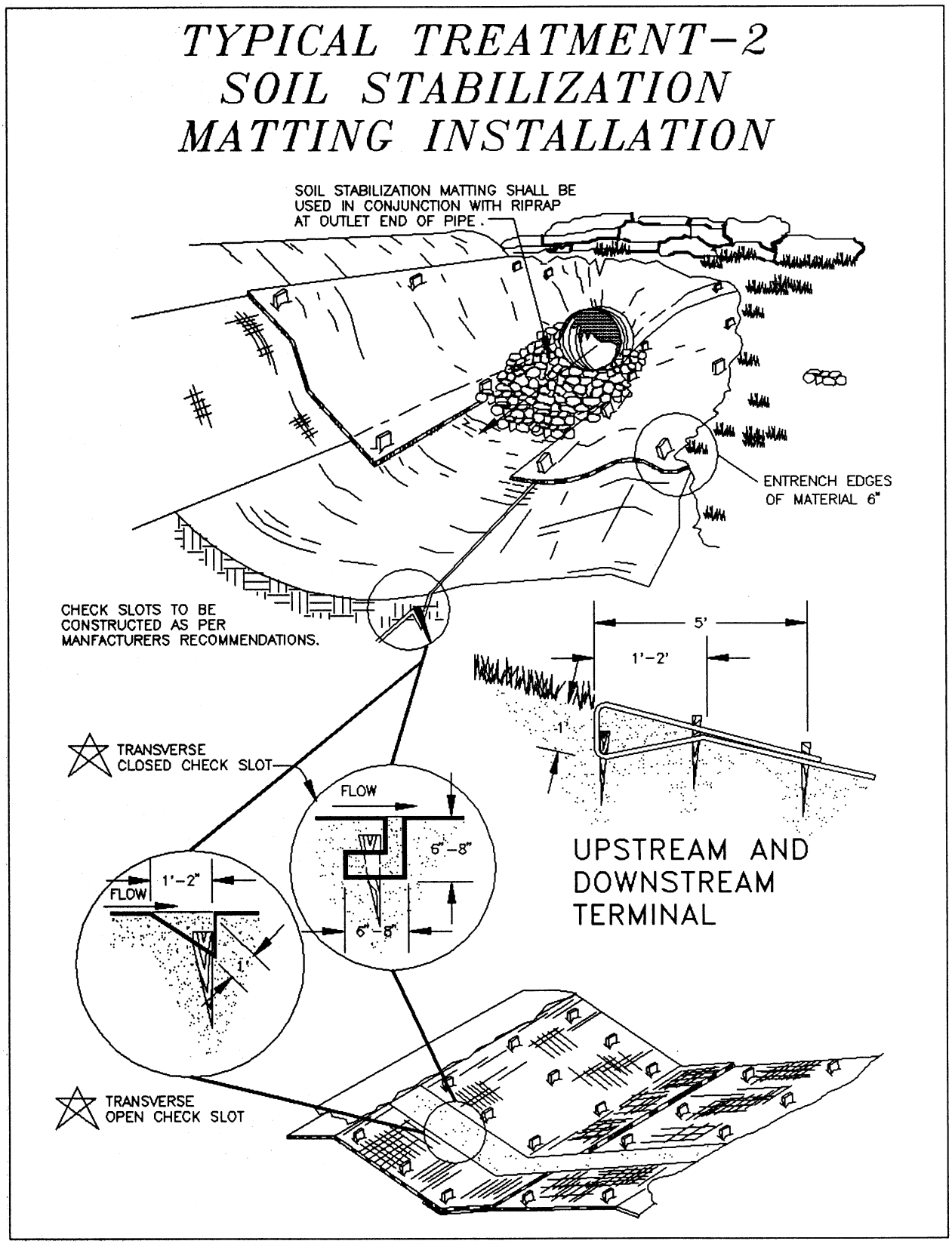
Securing the Material and Joining Mats - Again, product specifications vary - upstream and downstream terminal slots, new roll overlaps and multiple width installations differ by various products and manufacturers.

Final Check - These installation techniques must be adhered to:

1. Soil stabilization mat is in uniform contact with the soil.
2. All required slots and lapped joints are in place.
3. The material is properly anchored.
4. All disturbed areas are seeded.

Maintenance

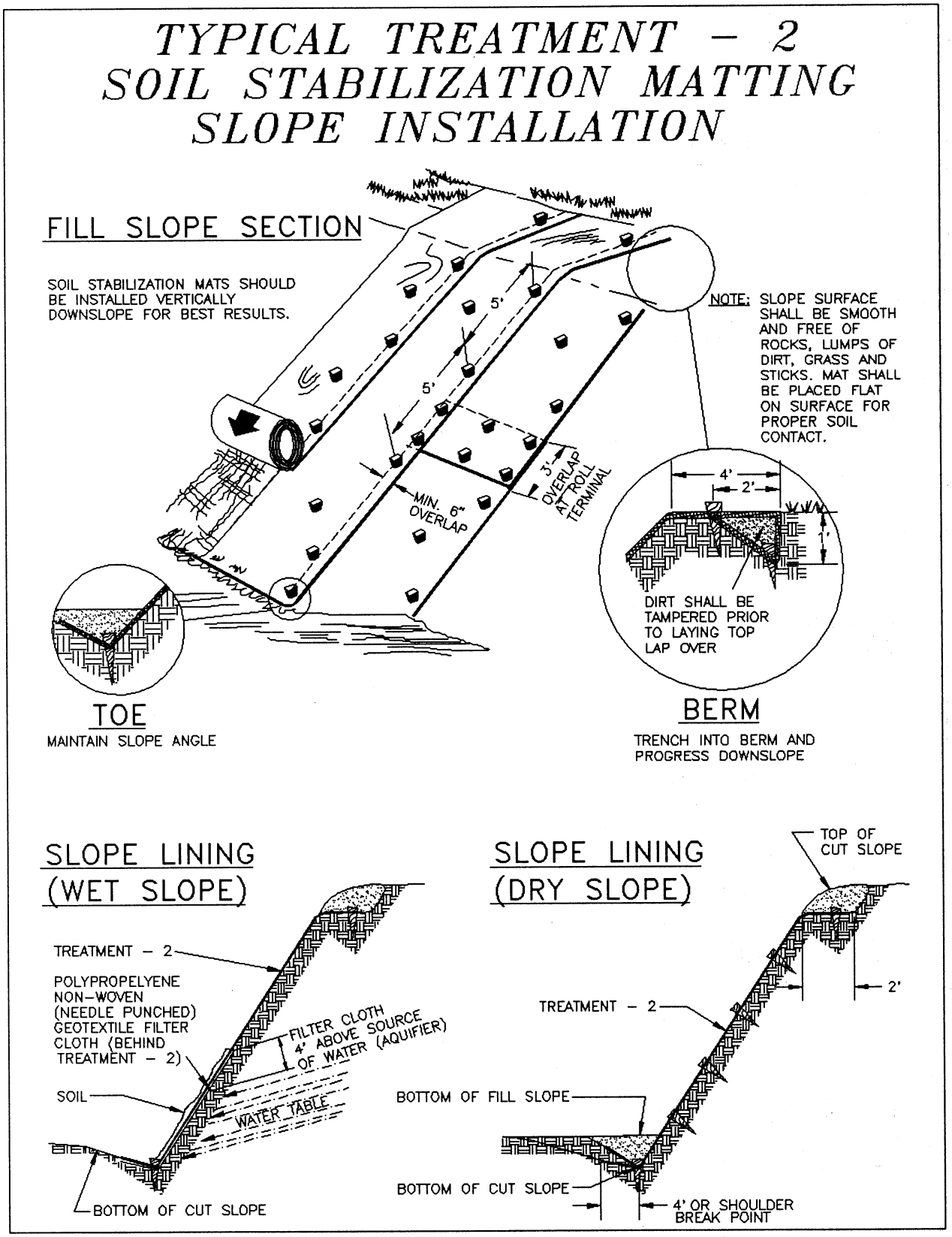
All soil stabilization blankets and matting should be inspected periodically following installation, particularly after rainstorms to check for erosion and undermining. Any dislocation or failure should be repaired immediately. If washouts or breakage occurs, re-install the material after repairing damage to the slope or ditch. Continue to monitor these areas until which time they become permanently stabilized; at that time an annual inspection should be adequate.



Source: VDOT Road and Bridge Standards

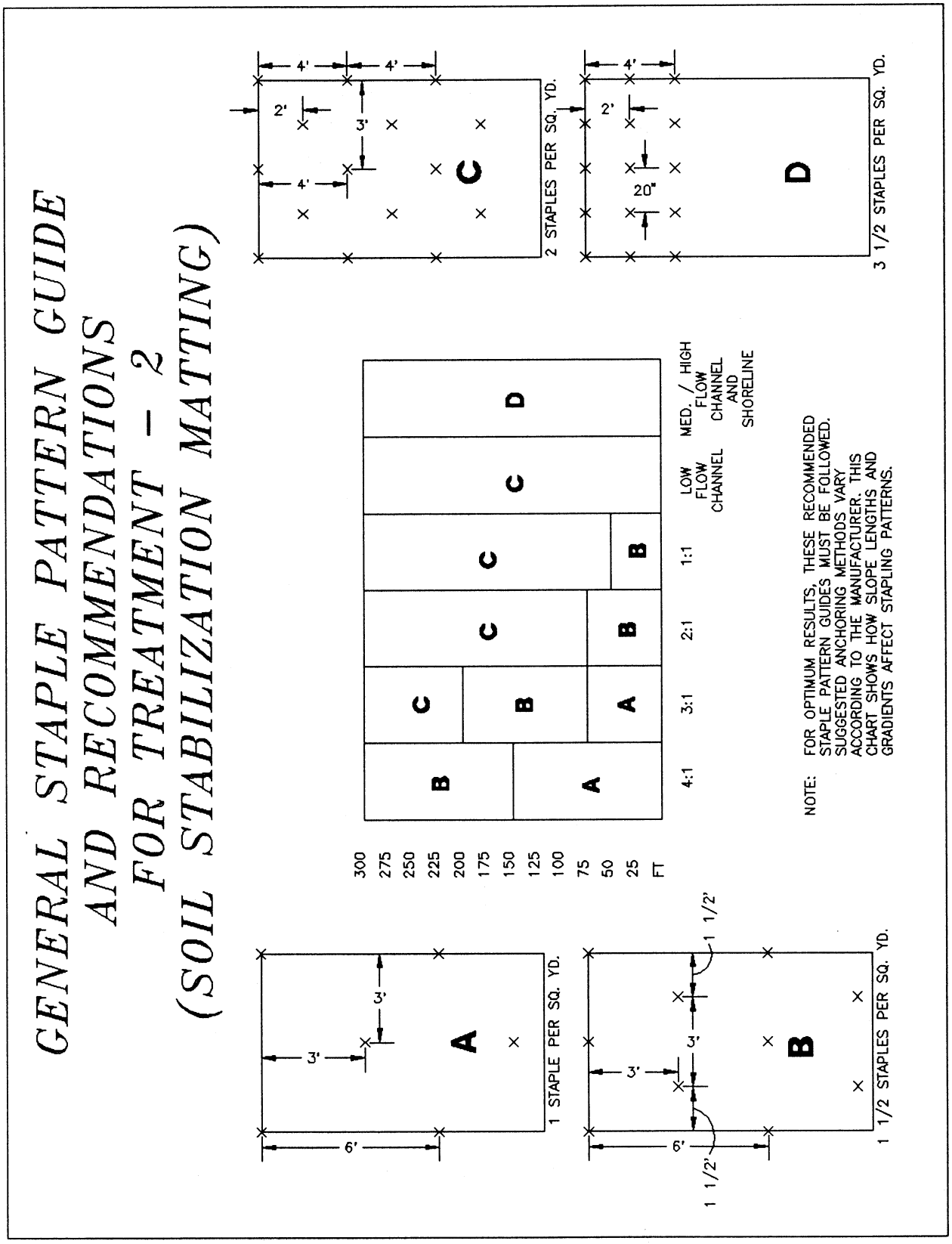
Plate 3.36-4

TYPICAL TREATMENT – 2
SOIL STABILIZATION MATTING
SLOPE INSTALLATION



Source: VDOT Road and Bridge Standards

Plate 3.36-5



Source: Product literature from North American Green

Plate 3.36-6

Permanent Seeding

STD & SPEC 3.32

PERMANENT SEEDING

PS

Definition

The establishment of perennial vegetative cover on disturbed areas by planting seed.

Purposes

1. To reduce erosion and decrease sediment yield from disturbed areas.
2. To permanently stabilize disturbed areas in a manner that is economical, adaptable to site conditions, and allows selection of the most appropriate plant materials.
3. To improve wildlife habitat.
4. To enhance natural beauty.

Conditions Where Practice Applies

1. Disturbed areas where permanent, long-lived vegetative cover is needed to stabilize the soil.

2. Rough-graded areas which will not be brought to final grade for a year or more.

Planning Considerations

Vegetation controls erosion by reducing the velocity and the volume of overland flow and protecting the bare soil surface from raindrop impact.

Areas which must be stabilized after the land has been disturbed require vegetative cover. The most common and economical means of establishing this cover is by seeding grasses and legumes. Permanent vegetative covers must meet the requirements of Minimum Standard #3.

Advantages of seeding over other means of establishing plants include the small initial establishment cost, the wide variety of grasses and legumes available, low labor requirement, and ease of establishment in difficult areas.

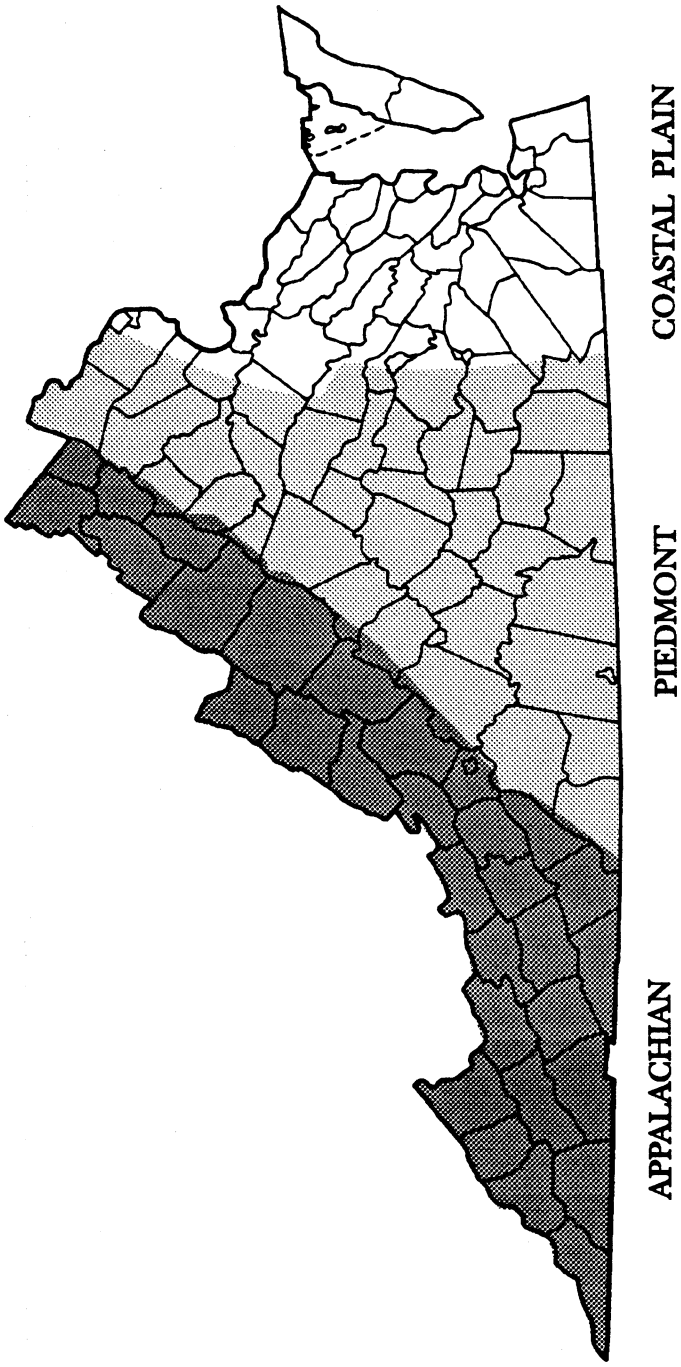
Disadvantages which must be dealt with are the potential for erosion during the establishment stage, a need to reseed areas that fail to establish, limited periods during the year suitable for seeding, the potential need for weed control during the establishment phase, and a need for water and appropriate climatic conditions during germination.

There are so many variables in plant growth that an end product cannot be guaranteed. Much can be done in the planning stages to increase the chances for successful seeding. Selection of the right plant materials for the site, good seedbed preparation, and conscientious maintenance are important.

SELECTING PLANT MATERIALS: The factors affecting plant growth are climate, soils, and topography. In Virginia, there are three major physiographic regions that reflect changes in soil and topography. In selecting appropriate plant materials, one should take into account the characteristics of the physiographic region in which the project is located (see Plate 3.32-1).

PHYSIOGRAPHIC REGIONS:

Coastal Plain - Soils on the Coastal Plain are deeply weathered, stratified deposits of sand and clay. They are generally acidic and low in plant nutrients. The sandy soils are hot and droughty in summer. This region receives more rain and is warmer than the other regions of the state. The land is fairly level, and many areas are poorly drained. Warm season grasses traditionally perform well in these areas.



PHYSIOGRAPHIC PROVINCES IN VIRGINIA

Source: Va. DSWC

Plate 3.32-1

Piedmont - Soils on the Piedmont plateau are highly variable. They tend to be shallow, with clayey subsoils. Piedmont soils are low in phosphorus. Soils derived from mica schist are highly erodible. Topography is rolling and hilly. The southern Piedmont has much the same climate as the Coastal Plain. Often referred to as the "transition zone" in planting. Contains areas that will support both warm or cool season grasses.

Appalachian and Blue Ridge Region - This region is divided into plateaus, mountains, and narrow valleys. Soils tend to be shallow and acid, and may erode rapidly on steep slopes. Shaley slopes are often unstable and droughty. This area is colder and drier than the rest of the State. The rugged topography makes plant establishment difficult. Cool season grasses are normally specified in this region.

SOILS: On the whole, soils in Virginia always require some nitrogen (N) fertilization to establish plants. Phosphorus (P) and potassium (K) are usually needed. Except for some small pockets of shallow limestone soils, lime is universally needed.

Soils can be modified with lime and fertilizer, but climate cannot be controlled. For this reason, the State has been divided into two major climatic regions, referred to as the Northern Piedmont and Mountain Region and the Southern Piedmont and Coastal Plain Region, for grass and legume selection (see map, Plate 3.32-2).

Microclimate, or localized climate conditions, can affect plant growth. A south-facing slope is drier and hotter than a north-facing slope, and may require drought-tolerant plants. Shaded areas require shade-tolerant plants; the windward side of a ridge will be drier than the leeward, etc.

LAND USE: A prime consideration in selecting which plants to establish is the intended use of the land. All of these uses - residential, industrial, commercial, recreational - can be separated into two major categories: high-maintenance and low-maintenance.

High-maintenance areas will be mowed frequently, limed and fertilized regularly, and will either receive intense use (e.g., athletics) or require maintaining to an aesthetic standard (home lawns). Grasses used for these situations must be fine-leaved and attractive in appearance, able to form tight sod, and be long-lived perennials. They must be well-adapted to the geographic area where they are planted, because constant mowing puts turf under great stress. Sites where high-maintenance vegetative cover is desirable include homes, industrial parks, schools, churches, athletic playing surfaces as well as some recreational areas.

Low-maintenance areas will be mowed infrequently or not at all; lime and fertilizer may not be applied on a regular basis; the areas will not be subjected to intense use, nor required to have a uniform appearance. These plants must be able to persist with little maintenance over long periods of time. Grass and legume mixtures are favored for these sites because legumes are capable of fixing nitrogen from the air for their own use, and the use of the plants around them. Such mixed stands are better able to withstand adverse conditions.

Sites that would be suitable for low-maintenance vegetation include steep slopes, stream or channel banks, some commercial properties, and "utility turf" areas such as roadbanks.

Seedbed Preparation - The soil on a disturbed site must be modified to provide an optimum environment for seed germination and seedling growth. The surface soil must be loose enough for water infiltration and root penetration. The pH (acidity and alkalinity) of the soil must be such that it is not toxic and nutrients are available, usually between pH 6.0-7.0. Sufficient nutrients (added as fertilizer) must be present. After seed is in place, it must be protected with a mulch to hold moisture and modify temperature extremes, and to prevent erosion while seedlings are growing.

The addition of lime is equally as important as applying fertilizer. Lime is best known as a pH, or acidity, modifier, but it also supplies calcium and magnesium which are plant nutrients. Its effect on pH makes other nutrients more available to the plant. It can also prevent aluminum toxicity by making aluminum less soluble in the soil. Many soils in Virginia are high in aluminum, which stunts the growth of plant roots.

MAINTENANCE: Even with careful, well-planned seeding operations, failures can occur. When it is clear that plants have not germinated on an area or have died, these areas must be reseeded immediately to prevent erosion damage. However, it is extremely important to determine for what reason germination did not take place and make any corrective action necessary prior to reseeding the area. Healthy vegetation is the most effective erosion control available.

Specifications

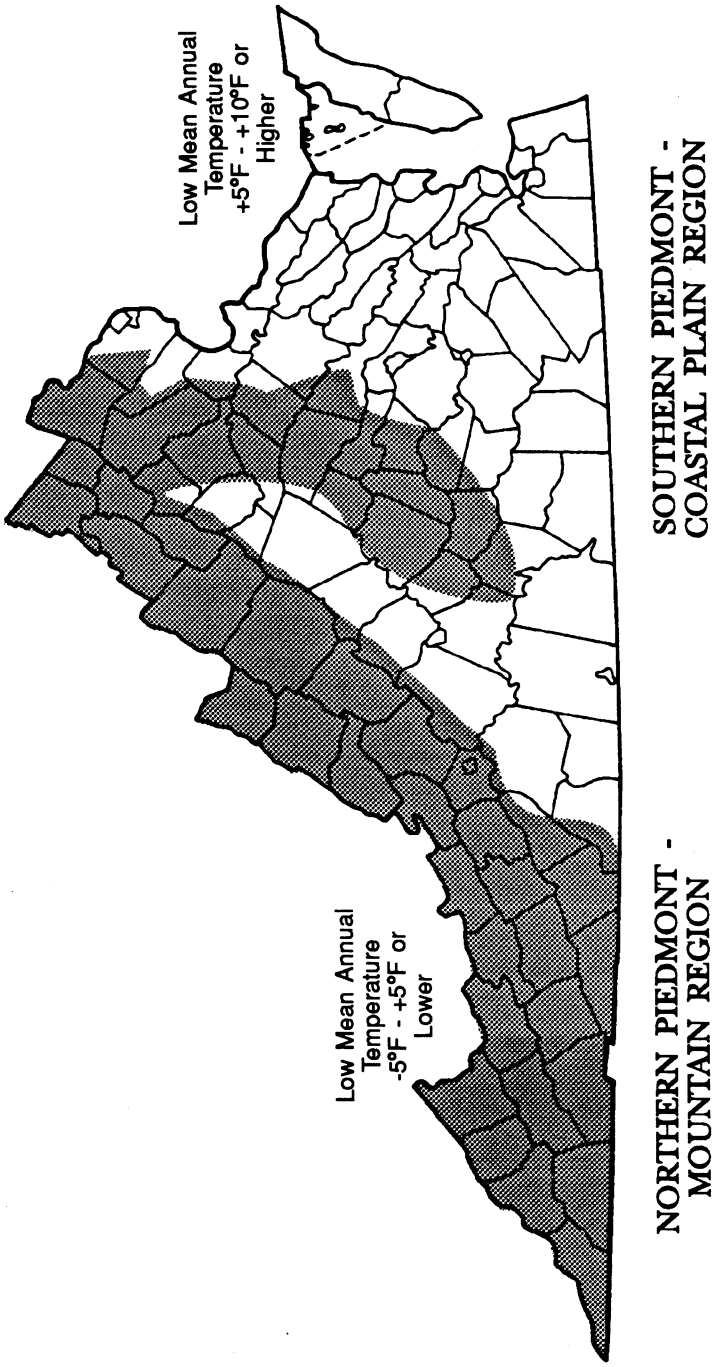
Selection of Plant Materials

1. Selection of plant materials is based on climate, topography, soils, land use, and planting season. To determine which plant materials are best adapted to a specific site, use Tables 3.32-A and 3.22-B which describe plant characteristics and list recommended varieties.

2. Appropriate seeding mixtures for various site conditions in Virginia are given in Tables 3.32-C, 3.32-D and 3.32-E. These mixtures are designed for general use, and are known to perform well on the sites described. Check Tables 3.32-A and 3.32-B for recommended varieties.

3. A more extensive description of plant materials (grasses and legumes), their usage and pictorial representation can be found in Appendix 3.32-c.

4. When using some varieties of turfgrasses, the Virginia Crop Improvement Association (VCIA) recommended turfgrass mixtures may also be used. Consumer protection programs have been devised to identify quality seed of the varieties recommended by the Virginia Cooperative Extension Service. These will bear a label indicating



PLANT HARDINESS ZONES IN VIRGINIA FOR GRASSES AND LEGUMES

Source: Adapted from Virginia Climate Advisory, 1979.

Plate 3.32-2

that they are approved by the Association. Mixtures may be designed for a specific physiographic region or based on intended use. Special consideration is given to plant characteristics, performance, etc.

TABLE 3.32-A
CHARACTERISTICS OF COMMONLY SELECTED GRASSES

COMMON NAME (Botanical Name)	Life Cycle	Season	pH Range	Germination Time In Days	Optimum Germination Temperature (°F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
TALL FESCUE (Festuca arundinacea)	P	C	5.5-6.2	10-14	60-85	F	F	M	SPD	225K	Low when used for erosion control; high when used in lawn	Better suited for erosion control and rough turf application.	Ky 31
TALL FESCUES (Improved)	P	C	5.5-6.2	10-14	60-85	F	G	M	SPD	220K	Responds well to high maintenance.	Excellent for lawn and fine turf.	See current VCIA list.
KENTUCKY BLUEGRASS (Poa pratense)	P	C	6.0-6.5	14	60-75	G	P	M	SPD	2.2m	Needs fertile soil, favorable moisture. Requires several years to become well established.	Excellent for fine turfs-takes traffic, mowing. Poor drought/heat tolerance.	See current VCIA list.
PERENNIAL RYEGRASS (Lolium perenne)	P	C	5.8-6.2	7-10	60-75	F	F	M-H	SPD	227K	Will tolerate traffic.	May be added to mixes. * Improved varieties will perform well all year.	See current VCIA list.

KEY

A = Annual P = Perennial C = Cool Season Plant W = Warm Season Plant G = Good F = Fair P = Poor VP = Very Poor H = High
M = Medium L = Low SPD = Somewhat Poorly Drained MPD = Moderately Poorly Drained PD = Poorly Drained VPD = Very Poorly Drained

TABLE 3.32-A (Continued)
CHARACTERISTICS OF COMMONLY SELECTED GRASSES

COMMON NAME (Botanical Name)		Life Cycle	Season	pH Range	Germination Time, In Days	Optimum Germination Temperature (°F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
FINE FESCUES	HARD FESCUE (Festuca Longifolia)	P	C	5.0-6.2	10-14	60-80	VG	G	L	MWD	400K	Grows well in sun or shade and will tolerate infertile soils; improved disease resistance.	Exceeds all fine fescues in most tests. Excellent for low-maintenance situations.	Reliant, Spartan, Aurora
	CHEWINGS FESCUE	P	C	5.0-6.2	10-14	60-80	VG	G	L	MWD	400K	Tolerates shade, dry infertile soils.	Poor traffic tolerance, less thatch than other fine fescues.	Flyer
	RED FESCUE (Festuca Rubra)	P	C	5.0-6.2	10-14	60-80	VG	G	L	MWD	400K	Low to medium fertility requirements. Requires well-drained soil.	Spreads by rhizomes, tillers and stolons. Will not take traffic - very shade tolerant.	Long-fellow, Victory
REED CANARYGRASS (Phalaris arundinacea)		P	C	5.8-6.2	21	70-85	G	G	M-H	VPD	530K	Do not mow closely or often.	Conservation cover in wet areas.	No named varieties

KEY

A = Annual P = Perennial C = Cool Season Plant W = Warm Season Plant G = Good F = Fair P = Poor VP = Very Poor H = High
M = Medium L = Low SPD = Somewhat Poorly Drained MPD = Moderately Poorly Drained PD = Poorly Drained VPD = Very Poorly Drained

TABLE 3.32-A (Continued)
CHARACTERISTICS OF COMMONLY SELECTED GRASSES

COMMON NAME (Botanical Name)	Life Cycle	Season	pH Range	Germination Time, In Days	Optimum Germination Temperature (°F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
REDTOP (Agrostis alba)	P	C	5.8-6.2	10	65-85	G	F	L	PD	5m	Will tolerate poor, infertile soils; deep rooted.	Does well in erosion control mixes - not for lawns.	No named varieties.
WEEPING LOVEGRASS (Evagrostis curvula)	P	W	4.5-6.2	14	65-85	F-P	G	L-M	SPD	1.5m	Low-fertility requirements; excellent drought tolerance.	Fast-growing, warm-season bunch grass. Excellent cover for erosion control.	No named varieties.
BERMUDAGRASS (Cynodon dactylon)	P	W	5.8-6.2	21	70-95	P	G	M-H	SPD	1.8m hulled	High nitrogen utilization, excellent drought tolerance. Some varieties adapted to western VA.	Common varieties used for erosion control. Hybrids used for fine turf.	See current VCIA list.
ORCHARDGRASS (Dactylis glomerata)	P	C	5.8-6.2	18	60-75	F	F	M	SPD	625K	Does best on well-drained, loamy soil.	Good pasture selection - may be grazed.	Virginia origin or Potomac

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TABLE 3.32-A (Continued)
CHARACTERISTICS OF COMMONLY SELECTED GRASSES

COMMON NAME (Botanical Name)	Life Cycle	Season	pH Range	Germination Time In Days	Optimum Germination Temperature (°F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
ANNUAL RYEGRASS (Lolium multiflorum)	A	C	5.8-6.2	7	60-70	G	P	M-H	SPD	227K	Will grow on most Virginia Soils. Do not use in fine-turf areas.	May be added into mixes or established alone as temporary cover in spring and fall.	No named varieties.
RYE (Secale cereale)	A	C	5.8-6.2	7	55-70	VG	G	L-M	SPD	18K	Will establish in most all Virginia soils. Do not use in fine-turf areas.	May be added into mixes or established alone for late fall/winter cover.	Abruzzi, Balboa
FOXTAIL MILLET (Setaria italica)	A	W	5.8-6.2	10	65-85	VP	G	M	MWD	220K	Establishes well during summer. Very low moisture requirements.	May be added to erosion-control mixes or established alone.	Common, German

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TABLE 3.32-B
CHARACTERISTICS OF LEGUMES APPROPRIATE FOR EROSION CONTROL

COMMON NAME (Botanical Name)	Life Cycle	Season	pH Range	Germination Time In Days	Optimum Germination Temperature (°F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
CROWNVETCH (Coronilla varia)	P	C	6.0-6.5	14-21	70	G	VG	M	MWD	110K	Does best on well-drained soils. Minimum maintenance when established. May need phosphorus. Inoculation is essential.	Excellent for steep, rocky slopes. Produces colorful blooms in May/June. Slow to establish. Does best when seeded in spring.	Penngift Chemung Emerald
SERICEA LESPEDEZA (Lespedeza cuneata)	P	W	5.8-6.2	21-28	70-85	F	VG	L	MWD	335K	Grows in most well-drained soils. Low fertility requirements. Inoculation is essential.	Use hulled seed in spring; unhulled in fall. Very deep-rooted legume. Excellent choice for eastern Va.	Serecia Interstate
FLATPEA (Lathyrus silvestrus)	P	C	5.0-7.0	14-28	65-75	G	G	L	PD	15K	Needs lime and high phosphorus. Good shade tolerance.	Tolerates acidic and wetter soils better than other legumes.	Lathco
BIRDSFOOT TREFOIL (Lotus corniculatus)	P	C	6.0-6.5	7	65-70	G	F	M	SPD	375K	Inoculation is essential. Grows in medium-fertile, slightly acid soils.	Grows better on poorly drained soils than most legumes. Poor drought/heat tolerance.	No named varieties.

KEY

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TABLE 3.32-B (Continued)
CHARACTERISTICS OF LEGUMES APPROPRIATE FOR EROSION CONTROL

COMMON NAME (Botanical Name)	Life Cycle	Season	pH Range	Germination Time In Days	Optimum Germination Temperature (°F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
ANNUAL LESPEDEZAS (Lespedeza striata, L. stipulacea)	A	W	5.8-6.2	14	70-85	F	VG	L	MWD	200K	Will grow on almost any well-drained soil.	Choose Kobe for southeastern Va.; needs almost no nitrogen to survive.	Kobe, Korean
RED CLOVER (Trifolium pratense)	P	C	6.0-6.5	7-14	70	G	F	M	SPD	275K	Needs high levels of phosphorus and potassium.	Acts as a biennial. Can be added to low-maintenance mixes.	Kenstar, Kenland
WHITE CLOVER (Trifolium repens)	P	C	6.0-6.5	10	70	G	P	M	PD	700K	Requires favorable moisture, fertile soils, high pH.	Spreads by soil surface stolons, white flowers.	Common, White Dutch

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TABLE 3.32-C
SITE SPECIFIC SEEDING MIXTURES
FOR APPALACHIAN/MOUNTAIN AREA

	Total Lbs. Per Acre
Minimum Care Lawn	
- Commercial or Residential	200-250 lbs.
- Kentucky 31 or Turf-Type Tall Fescue	90-100%
- Improved Perennial Ryegrass *	0-10%
- Kentucky Bluegrass	0-10%
High-Maintenance Lawn	
Minimum of three (3) up to five (5) varieties of bluegrass from approved list for use in Virginia.	125 lbs.
General Slope (3:1 or less)	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop **	20 lbs.
	150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	
- Kentucky 31 Fescue	108 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop **	20 lbs.
- Crownvetch ***	20 lbs.
	150 lbs.

* Perennial Ryegrass will germinate faster and at lower soil temperatures than fescue, thereby providing cover and erosion resistance for seedbed.

** Use seasonal nurse crop in accordance with seeding dates as stated below:

March, April through May 15th ..... Annual Rye
May 16th through August 15th ..... Foxtail Millet
August 16th through September, October ..... Annual Rye
November through February ..... Winter Rye

*** If Flatpea is used, increase to 30 lbs./acre. All legume seed must be properly inoculated. Weeping Lovegrass may also be included in any slope or low-maintenance mixture during warmer seeding periods; add 10-20 lbs/acre in mixes.

TABLE 3.32-D
SITE SPECIFIC SEEDING MIXTURES FOR PIEDMONT AREA

	Total Lbs. Per Acre
Minimum Care Lawn	
- Commercial or Residential	175-200 lbs.
- Kentucky 31 or Turf-Type Tall Fescue	95-100%
- Improved Perennial Ryegrass	0-5%
- Kentucky Bluegrass	0-5%
High-Maintenance Lawn	200-250 lbs.
- Kentucky 31 or Turf-Type Tall Fescue	100%
General Slope (3:1 or less)	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
	150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	
- Kentucky 31 Fescue	108 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
- Crownvetch **	20 lbs.
	150 lbs.

* Use seasonal nurse crop in accordance with seeding dates as stated below:

February 16th through April ..... Annual Rye
May 1st through August 15th ..... Foxtail Millet
August 16th through October ..... Annual Rye
November through February 15th ..... Winter Rye

** Substitute Sericea lespedeza for Crownvetch east of Farmville, Va. (May through September use hulled Sericea, all other periods, use unhulled Sericea). If Flatpea is used in lieu of Crownvetch, increase rate to 30 lbs./acre. All legume seed must be properly inoculated. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in mixes.

TABLE 3.32-D

SITE SPECIFIC SEEDING MIXTURES FOR COASTAL PLAIN AREA

	Total Lbs. Per Acre
Minimum Care Lawn	
- Commercial or Residential	
- Kentucky 31 or Turf-Type Tall Fescue	175-200 lbs.
or	
- Common Bermudagrass **	75 lbs.
High-Maintenance Lawn	
- Kentucky 31 or Turf-Type Tall Fescue	200-250 lbs.
or	
- Hybrid Bermudagrass (seed) **	40 lbs. (unhulled)
or	30 lbs. (hulled)
- Hybrid Bermudagrass (by other vegetative establishment method, see Std. & Spec. 3.34)	
General Slope (3:1 or less)	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
	150 lbs.
Low Maintenance Slope (Steeper than 3:1)	
- Kentucky 31 Tall Fescue	93-108 lbs.
- Common Bermudagrass **	0-15 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
- Sericea Lespedeza **	20 lbs.
	150 lbs.

* Use seasonal nurse crop in accordance with seeding dates as stated below:

February, March through April . . . . . Annual Rye
May 1st through August . . . . . Foxtail Millet
September, October through November 15th . . . . . Annual Rye
November 16th through January . . . . . Winter Rye

** May through October, use hulled seed. All other seeding periods, use unhulled seed. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in mixes.

Seedbed Requirements

Vegetation should not be established on slopes that are unsuitable due to inappropriate soil texture, poor internal structure or internal drainage, volume of overland flow, or excessive steepness, until measures have been taken to correct these problems.

To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. The existing soil must have these characteristics:

1. Enough fine-grained material to maintain adequate moisture and nutrient supply.

2. Sufficient pore space to permit root penetration. A bulk density of 1.2 to 1.5 indicates that sufficient pore space is present. A fine granular or crumb-like structure is also favorable.

3. Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans shall be 12 inches or more, except on slopes steeper than 2:1 where the addition of soil is not feasible.

4. A favorable pH range for plant growth. If the soil is so acidic that a pH range of 6.0-7.0 cannot be attained by addition of pH-modifying materials, then the soil is considered an unsuitable environment for plant roots and further soil modification would be required.

5. Freedom from toxic amounts of materials harmful to plant growth.

6. Freedom from excessive quantities of roots, branches, large stones, large clods of earth, or trash of any kind. Clods and stones may be left on slopes steeper than 3:1 if they do not significantly impede good seed soil contact.

If any of the above criteria cannot be met, i.e., if the existing soil is too coarse, dense, shallow, acidic, or contaminated to foster vegetation, then topsoil shall be applied in accordance with TOPSOILING, Std. & Spec. 3.30.

Necessary structural erosion and sediment control practices will be installed prior to seeding. Grading will be carried out according to the approved plan.

Surfaces will be roughened in accordance with SURFACE ROUGHENING, Std. & Spec. 3.29.

Soil Conditioners

In order to modify the texture, structure, or drainage characteristics of a soil, the following materials may be added to the soil:

1. Peat is a very costly conditioner, but works well. If added, it shall be sphagnum moss peat, hypnum moss peat, reed-sedge peat or peat humus, from fresh-water sources. Peat shall be shredded and conditioned in storage piles for at least six months after excavation.

2. Sand shall be clean and free of toxic materials. Sand modification is ineffective unless you are adding 80 to 90% sand on a volume basis. This is extremely difficult to do on-site. If this practice is considered, consult a professional authority to ensure that it is done properly.

3. Vermiculite shall be horticultural grade and free of toxic substances. It is an impractical modifier for larger acreage due to expense.

4. Raw manure is more commonly used in agricultural applications. However, when stored properly and allowed to compost, it will stabilize nitrogen and other nutrients. Manure, in its composted form, is a viable soil conditioner; however, its use should be based on site-specific recommendations offered by a professional in this field.

5. Thoroughly rotted sawdust shall have 6 pounds of nitrogen added to each cubic yard and shall be free of stones, sticks, and toxic substances.

6. The use of treated sewage sludge has benefitted from continuing advancements in its applications in the agricultural community. When composted, it offers an alternative soil amendment. Limitations include a potentially undesirable pH (because of lime added during the treatment process) and the possible presence of heavy metals. This practice should be thoroughly evaluated by a professional and be used in accordance with any local, state, and federal regulations.

Lime and Fertilizer

Lime and fertilizer needs should be determined by soil tests. Soil tests may be performed by the Cooperative Extension Service Soil Testing Laboratory at VPI&SU, or by a reputable commercial laboratory. Information concerning the State Soil Testing Laboratory is available from county extension agents. Reference Appendix 3.32-d for liming applications (in lbs.) needed to correct undesirable pH for various soil types.

Under unusual conditions where it is not possible to obtain a soil test, the following soil amendments will be applied:

Lime

Coastal Plain: 2 tons/acre pulverized agricultural grade limestone (90 lbs./1000 ft.^{2}).

Piedmont and Appalachian Region: 2 tons/acre pulverized agricultural grade limestone (90 lbs./1000 ft.^{2}).

Note: An agricultural grade of limestone should always be used.

Fertilizer

Mixed grasses and legumes: 1000 lbs./acre 10-20-10 or equivalent nutrients (23 lbs./1000 ft.^{2}).

Legume stands only: 1000 lbs./acre 5-20-10 (23 lbs./ 1000 ft.^{2}) is preferred; however, 1000 lbs./acre of 10-20-10 or equivalent may be used.

Grass stands only: 1000 lbs./acre 10-20-10 or equivalent nutrients, (23 lbs./1000 ft.^{2}).

Other fertilizer formulations, including slow-release sources of nitrogen (preferred from a water quality standpoint), may be used provided they can supply the same amounts and proportions of plant nutrients.

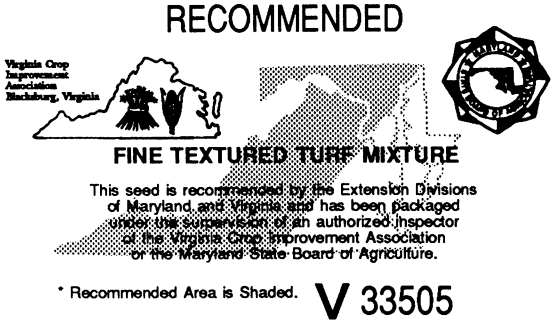
Incorporation - Lime and fertilizer shall be incorporated into the top 4-6 inches of the soil by discing or other means whenever possible. For erosion control, when applying lime and fertilizer with a hydroseeder, apply to a rough, loose surface.

Seeding

1. Certified seed will be used for all permanent seeding whenever possible. Certified seed is inspected by the Virginia Crop Improvement Association or the certifying agency in other states. The seed must meet published state standards and bear an official "Certified Seed" label (see Appendix 3.32-a).

Kentucky Bluegrass Seed Mixtures

MARYLAND - VIRGINIA
RECOMMENDED



Kentucky Bluegrass Seed Blends

VIRGINIA - MARYLAND
RECOMMENDED

2. Legume seed should be inoculated with the inoculant appropriate to the species. Seed of the Lespedezas, the Clovers and Crownvetch should be scarified to promote uniform germination.

3. Apply seed uniformly with a broadcast seeder, drill, culti-packer seeder, or hydroseeder on a firm, friable seedbed. Seeding depth should be 1/4 to 1/2 inch.

4. To avoid poor germination rates as a result of seed damage during hydroseeding, it is recommended that if a machinery breakdown of 30 minutes to 2 hours occurs, 50% more seed be added to the tank, based on the proportion of the slurry remaining in the tank. Beyond 2 hours, a full rate of new seed may be necessary.

   Often hydroseeding contractors prefer not to apply lime in their rigs as it is abrasive. In inaccessible areas, lime may have to be applied separately in pelletized or liquid form. Surface roughening is particularly important when hydroseeding, as a roughened slope will provide some natural coverage of lime, fertilizer and seed.

   Legume inoculants should be applied at five times the recommended rate when inoculant is included in the hydroseeder slurry.

   Mulching

   All permanent seeding must be mulched immediately upon completion of seed application. Refer to MULCHING, Std. & Spec. 3.35.

   Maintenance of New Seedings

   In general, a stand of vegetation cannot be determined to be fully established until it has been maintained for one full year after planting.

   Irrigation: New seedings should be supplied with adequate moisture. Supply water as needed, especially late in the season, in abnormally hot or dry weather, or on adverse sites. Water application rates should be controlled to prevent excessive runoff. Inadequate amounts of water may be more harmful than no water.

   Re-seeding: Inspect seeded areas for failure and make necessary repairs and re-seedings within the same season, if possible.

   a. If vegetative cover is inadequate to prevent rill erosion, over-seed and fertilize in accordance with soil test results.

   b. If a stand has less than 40% cover, re-evaluate choice of plant materials and quantities of lime and fertilizer. The soil must be tested to determine if acidity or nutrient imbalances are responsible. Re-establish the stand following seedbed preparation and seeding recommendations.

Fertilization: Cool season grasses should begin to be fertilized 90 days after planting to ensure proper stand and density. Warm season fertilization should begin at 30 days after planting.

Apply maintenance levels of fertilizer as determined by soil test. In the absence of a soil test, fertilization should be as follows:

Cool Season Grasses

4 lbs. nitrogen (N)

1 lb. phosphorus (P) } Per 1000 ft.^{2} per year

2 lbs. potash (K)

Seventy-five percent of the total requirements should be applied between September 1 and December 31st. The balance should be applied during the remainder of the year. **More than 1 lb. of soluble nitrogen per 1000 ft.^{2} should not be applied at any one time.**

Warm Season Grasses

Apply 4-5 lbs. nitrogen (N) between May 1 and August 15th per 1000 ft.^{2} per year.

Phosphorus (P) and Potash (K) should only be applied according to soil test.

Note: The use of slow-release fertilizer formulations for maintenance of turf is encouraged to reduce the number of applications and the impact on groundwater.

Additional Information on the Successful Establishment of Grasses and Legumes

See Appendix 3.32-b for "helpful hints" in achieving high success rates in grass or legume plantings.

APPENDIX 3.32-a

SEED QUALITY CRITERIA

Where certified seed is not available, the minimum requirements for grass and legume seed used in vegetative establishment are as follows:

a. All tags on containers of seed shall be labeled to meet the requirements of the State Seed Law.

b. All seed shall be subject to re-testing by a recognized seed laboratory that employs a registered seed technologist or by a state seed lab.

c. All seed used shall have been tested within twelve (12) months.

d. Inoculant - the inoculant added to legume seed in the seed mixtures shall be a pure culture of nitrogen-fixing bacteria prepared for the species. Inoculants shall not be used later than the date indicated on the container. Twice the supplier's recommended rate of inoculant will be used on dry seedings; five times the recommended rate if hydroseeded.

e. The quality of the seed used shall be shown on the bag tags to conform to the guidelines in Table 3.32-E.

TABLE 3.32-E

QUALITY OF SEED*

	Minimum Seed Purity (%)	Minimum Germination (%)
Legumes		
Crownvetch	98	65**
Lespedeza, Korean	97	85**
Lespedeza, Sericea	98	85**
Grasses		
Bluegrass, Kentucky	97	85
Fescue, Tall (Improved, Turf-Type Cultivars)	98	85
Fescue, Tall (Ky-31)	97	85
Fescue, Red	98	85
Redtop	94	80
Reed Canarygrass	98	80
Perennial Ryegrass	98	90
Weeping Lovegrass	98	87
Annuals		
Annual Ryegrass	97	90
German Millet	98	85
Oats	98	80
Cereal Rye	98	85

* Seed containing prohibited or restricted noxious weeds should not be accepted. Seed should not contain in excess of 0.5% weed seed. To calculate percent pure, live seed, multiply germination times purity and divide by 100.

Example: Ky-31 Tall Fescue with a germination of 85 percent and a purity of 97 percent.

97 x 85 = 8245. 8245 ÷ 100 = 82.45 percent pure live seed.

** Includes "hard seed"

APPENDIX 3.32-b

KEYS TO SUCCESSFUL ESTABLISHMENT OF GRASSES AND LEGUMES

Planning

Where feasible, grading operations should be planned around optimal seeding dates for the particular region. The most effective times for establishing perennial grass in Virginia generally extend from March through May and from August through October. Outside these dates, the probability of failure is much higher. If the time of year is not suitable for seeding a permanent cover (perennial species), a temporary cover crop should be planted. Temporary seeding of annual species (small grains, ryegrasses or millets) often succeeds during periods of the year that are unsuitable for seeding permanent (perennial) species.

Variations in weather and local site conditions can modify the effects of regional climate on seeding success. For this reason, mixtures including both cool and warm season species are preferred for low-maintenance cover, particularly in the Coastal Plain. Such mixtures promote cover which can adapt to a range of conditions. Many of these mixtures are not desirable, however, for high quality lawns, where variation in texture of the turf is inappropriate. It is important to note that in Virginia the establishment of 100% warm season grasses in a high quality lawn is limited to the extreme eastern portions of the Coastal Plain.

Selection

Species selection should be considered early in the process of preparing an erosion and sediment control plan. A variety of vegetation can be established in Virginia due to the diversity in both soils and climate. However, for practical, economical stabilization and long-term protection of disturbed sites, species selection should be made judiciously.

Seasonality must be considered when selecting species. Grasses and legumes are usually classified as warm or cool season in reference to their season of growth. Cool season plants realize most of their growth during the spring and fall and are relatively inactive or dormant during the hot summer months. Therefore, fall is the most favorable time to plant them. Warm season plants "green-up" late in the spring, grow most actively during the summer, and go dormant at the time of the first frost in fall. Spring and early summer are preferred planting times for warm season plants.

Seed Mixtures

As previously noted, the establishment of high quality turf frequently involves planting one single species. However, in seedings for erosion control purposes, the inclusion of more than one species should always be considered. Mixtures need not be excessive in poundage or seed count. The addition of a quick-growing annual provides early protection and facilitates establishment of one or two perennials in a mix. More complex mixtures might include a quick-growing annual, one or two legumes and more than one perennial grass.

The addition of a "nurse" crop (quick-growing annuals added to permanent mixtures) is a sound practice for soil stabilization, particularly on difficult sites - those with steep slopes; poor, rocky, erosive soils; those seeded out the optimum seeding periods; or in any situation where the development of permanent cover is likely to be slow. The nurse crop germinates and grows rapidly, holding the soil until the slower-growing perennial seedlings become established.

APPENDIX 3.32-c

PLANT INFORMATION SHEETS

Contents:

Annual Grasses and Grains

Oats
Rye
Foxtail Millet
Annual Ryegrass

Annual Legumes

Annual Lespedeza

Perennials

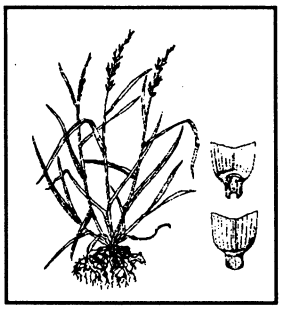
Tall Fescue
Kentucky Bluegrass
Perennial Ryegrass
Fine Fescues
Bermudagrass
Reed Canarygrass

Miscellaneous Erosion Control Grasses

Weeping Lovegrass
Redtop

Legumes

Crownvetch
Flatpea
Sericea Lespedeza
White Clover



ANNUAL GRASSES AND GRAINS

Small grains are cool season annual grasses primarily grown for animal feed and human consumption. In Virginia, the grains used for soil stabilization are primarily Rye and Oats. Foxtail Millet, which is sometimes considered a small grain, is becoming a very popular and successful planting for soil stabilization.

1. Oats (Avenasativa): A cool season annual grass primarily grown for animal feed and human consumption, but also used for soil stabilization. Oats are seeded in early spring in the western part of the state (winter oats may be sown in the Coastal Plain). Seeding rates are 3 bushels (100 lbs.) per acre bare ground or 2-1/2 lbs. per 1000 square feet.

2. Rye (Secale cereale): Often referred to as Winter Rye because of its winter hardiness, Rye is the most common small grain used for soil stabilization. It is also the most productive grain on dry, infertile, acid or sandy soils. It may be seeded in the fall for winter ground cover. By maturing early, it offers less competition during the late spring period, a critical time in the establishment of perennial species. Rye grain germinates quickly and is tolerant of poor soils. Including Rye grain in fall-seeded mixtures is almost always advantageous, but it is particularly helpful on difficult and erodible soils, erodible slopes or when seeding is late. Rates up to 100 lbs. for bare ground. Overly thick stands of Rye grain will suppress the growth of perennial seedlings. Approximately 50 lbs. per acre is the maximum for this purpose and, where lush growth is

Rye (Secale cereale)

expected, that rate should either be cut in half, or Rye grain should be totally eliminated from the mixture.

3. Foxtail Millet (Setaria italica): A warm season annual grass which may be used for temporary cover. German Millet (variety commonly used in Virginia) germinates quickly and goes to seed quickly. These features make it an excellent companion grass for summer seedlings. It dies at first frost. Seeding rates are up to 50 lbs. per acre for temporary cover. Use 10 to 20 lbs. per acre in mixes.

4. Annual Rye (Lolium multiflorum): A cool season annual grass used for temporary cover or as a nurse grass to allow for germination of permanent stands. Most commonly used in mixes for erosion control. Performs well throughout the state in neutral to slightly acid soils. Rates up to 100 lbs. per acre for temporary cover. Use 10 to 20 lbs. per acre in mixes.

Foxtail Millet (Setaria italica)

Annual Rye (Lolium multiflorum)

ANNUAL LEGUMES

1. Annual Lespedezas (Lespedeza striata)

Uses: Pasture, hay, erosion control, soil improvement, wildlife food.

Description: Annual warm season legumes. Korean Lespedeza is larger and coarser than Common Lespedeza and grows to about 12 inches. Seed of Korean is shiny and black, while seed of Common is stippled. Kobe is the most desirable variety of Common Lespedeza.

Adaptation: Throughout Virginia. Optimum pH range is 6.0 to 6.5; will grow from 5.5 to 7.0. Will grow in soil textures ranging from sands to clays and through a wide range of fertility conditions.

Establishment: Seed should always be inoculated. May be seeded alone or mixed with grasses or small grains. Requires a firm seedbed; may be broadcast or drilled. Should be seeded in early spring at 25 to 40 lbs. per acre or one-half to 1 lb. per 1000 square feet, depending on use. (Use lower figure as half the seeding rate of any spring seeding with grass or grain.) Should not be mowed at less than three inches. Lespedeza will not make a large contribution in sod grasses like Bluegrass; they do best in open sod grasses like tall fescue.

Sources: Seed of common variety (Kobe) and Korean varieties (Climax, Harbin and Rowan) are commercially available.

Annual Lespedezas (Lespedeza striata)

PERENNIALS

1. Tall Fescue (Festuca arundinacea)

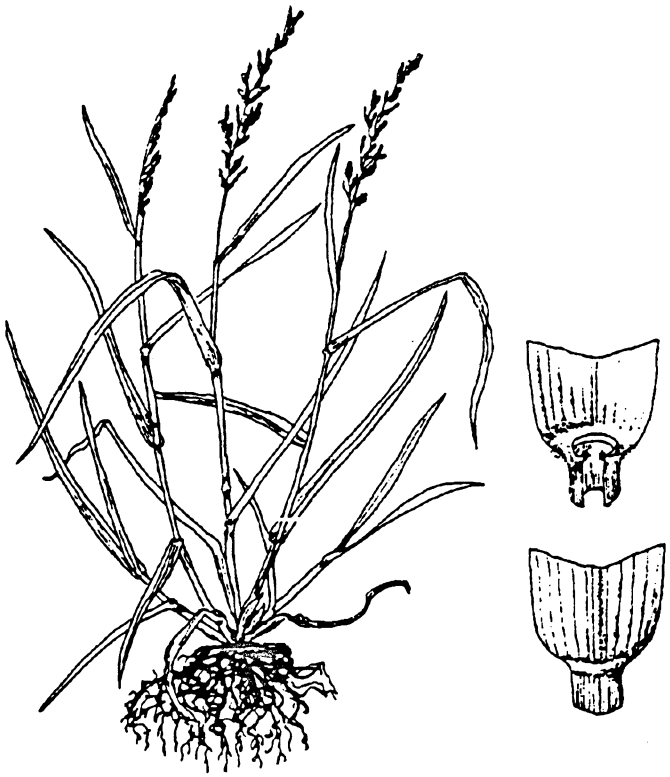
Uses: Pasture, hay, recreation areas, lawns and stabilization of waterways, banks, slopes, cuts, fills, and spoils. It is the most widely used grass at this time for stabilizing large disturbed areas.

Description: A robust, cool season, long-lived, deep-rooted bunchy grass which may have short rhizomes (underground stems). Kentucky 31 is the best-known variety. A number of new varieties of Tall Fescue are becoming available for lawn and other fine-turf uses, and several offer definite improvements. However, their higher cost over the old standby, KY 31, is seldom justified when used for purposes of stabilization and erosion control. Tall Fescue tolerates a wide range of seeding dates; however, with the possible exception of high mountain elevation, it is most dependable when planted in fall.

Adaptation: Adapts well to both high and low maintenance uses throughout Virginia. Adapted to a wide range of climatic conditions. Optimum pH range is 6.0 to 7.0; will tolerate from 3.0 to 8.0. Will grow on shallow and claypan soils if they are moist. Growth is limited more by moisture than by temperature extremes, but it will tolerate drought, infertile soils and moderate shade.

Establishment: Requires a firm seedbed. Hydroseeding is successful. Seeding rates vary from 100 lbs. per acre for erosion control to 250 lbs. per acre for lawns. Plant in early spring or from the middle of August through September. Legumes may not thrive in fescue stands due to the aggressive growth habits of this grass. Mowing is desirable on critical areas at least once every two years; lack of periodic mowing will encourage clumpiness.

Sources: Readily available as seed and sod.



Tall Fescue (Festuca arundinacea)

2. Kentucky Bluegrass (Poa pratense)

Uses: Pasture, turf for lawns, athletic fields, golf courses, and playgrounds. Also used to stabilize waterways, slopes, cuts and fills. Choice food for grouse, turkeys, deer and rabbits.

Description: Long-lived, cool season perennial grass which forms a dense sod. Becomes dormant in the heat of summer since its growing season is spring and fall.

Adaptation: Best adapted to well-drained, fertile soils of limestone origin and the climate of northern and western Virginia. Optimum pH range is 6.0 to 7.0. Bluegrasses are better suited to high maintenance situations in the transition zone. Essentially dormant during dry or hot weather; however, it will normally survive severe drought.

Establishment: Requires a firm, weed-free seedbed and adequate fertilization (liberal phosphorus) and lime are important. Can be used with Tall Fescues at low rates. Minimum mowing height is 1-1/2 inches. Critical erosion areas may be mowed only once per year, if desired. This grass is usually seeded with a mixture of other grasses or legumes; several varieties of Bluegrass should be used together to ensure good stand survival. Bare ground rates are 120 lbs. per acre. Overseed 1 to 1-1/2 per 1000 square feet.

Kentucky Bluegrass (Poa pratense)

Sources: Readily available as seed and sod.

3. Perennial Ryegrass (Lolium perrenne)

Uses: Erosion control, soil improvement, lawns, pasture, and hay; newer varieties are excellent for high-traffic areas.

Description: Perennial Ryegrasses are an excellent selection where rapid establishment is desired. Cool season. Ryegrasses cross-pollinate freely so "Common Ryegrass" may be a mixture of annual and perennial species. Certified seed of Perennial Ryegrass varieties is produced: Blaser, Palmer, Goalie, Fiesta II, Ranger, Regal and Pennfine may be used in Virginia.

Perennial Ryegrass (Lolium perrenne)

Adaptation: Throughout Virginia. Grows best on dark, rich soils in mild climates. Newer varieties have good drought tolerance but may require irrigation if under drought stress or heavy traffic. Will tolerate wet soils with good surface drainage.

Establishment: A firm, mellow surface over compact subsoils gives good results. Seed in fall or spring. Perennial Ryegrass may also be seeded in mid-August to early September. For turf, use a rate of 5 to 8 lbs. per 1000 square feet, if seeded alone; lesser amounts are suitable in mixtures, depending on the characteristics of the companion species. Generally not seeded alone except on athletic fields with intensive use. Perennial Ryegrass does best when used with bluegrass as 20 percent or less of the mixture. Ryegrasses germinate rapidly which makes them particularly suited to disturbed-area stabilization and temporary

seeding. They will, however, tend to dominate stands in mixtures if percentage is too high.

Sources: Readily available commercially. Care should be taken to buy seed appropriate to the needs of the project.

4. Fine Fescues

* Red Fescue
* Hard Fescue
* Chewings Fescue

Uses: Excellent for shady, low maintenance areas and north-facing slopes. May be used to stabilize waterways, slopes, banks, cuts, fills, and as a cover crop in orchards.

Description: Red Fescue is a cool season perennial that occurs in two forms: bunch-type and creeping. Creeping Red Fescue forms a tight sod. The leaves of Red Fescue are narrow and wiry. Hard Fescues are slow-growing with excellent shade tolerance.

Adaptation: Shade tolerant and somewhat drought-resistant once established. Grows well in sandy and acidic soils. Optimum pH range is 4.5 to 6.0. Prefers well-drained soils but requires adequate moisture for establishment. In areas of high temperature and humidity (such as southeastern Virginia), some Fine Fescues may turn brown or deteriorate during the summer. Newer varieties of Hard Fescue are more drought tolerant.

Establishment: Rarely seeded in pure stands. Seedbed preparation and fertility adjustments are usually dictated by the other grasses in the mixture. Red Fescues may comprise 25 to 60% by weight of a seeding mixture. In shaded areas red fescue may be the key grass in the mixture. Mowing consistently below 1-1/2 is not recommended.

Sources: Readily available commercially. New Hard Fescues may be in short supply.

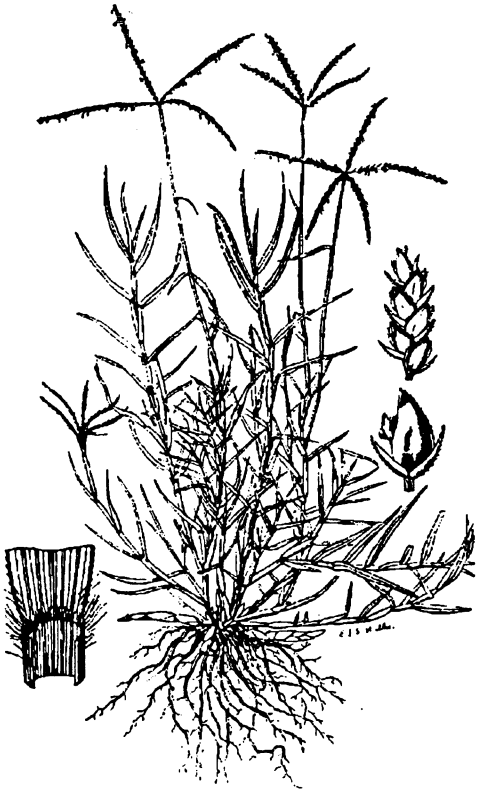
Red Fescue (Festuca rubra)

5. Bermudagrass (Cynodon dactylion)

Uses: Soil and water conservation, pasture, hay, silage, lawns, both high maintenance and general purpose turf, and stabilization of grassed waterways.

Description: A long-lived, warm season perennial that spreads by stolons and rhizomes (runners and underground stems). Height of stems of Common Bermudagrass may be 12 inches. The stems are short-jointed and the leaves flat and spreading. Common Bermudagrass may be established vegetatively with sprigs (sections of stems) or from seeds; however, it has the potential to develop into a weed problem because it spreads vigorously. Cold-tolerant hybrids are usually specified. These are traditionally established from sprigs or sod, but seed is now available.

Adaptation: Southern Piedmont and Coastal Plain in Virginia and some southern appalachian ridges and valleys. Check Std. & Spec. 3.34 for regional adaptations of varieties. Makes its best growth when average daily temperatures are above 75 degrees. Grows on a wide range of soils from heavy clays to deep sands. Optimum pH is 6.0 to 6.5. It is drought-resistant and salt-tolerant. Tolerates floods of short duration but will not thrive on waterlogged soils; does not persist under heavy shade. For rough areas, the varieties Midland (a forage hybrid) and Coastal are recommended. For fine-turf areas, Tufcote (a fine-leaved turf hybrid), Midiron, Tifway, and Vamont are used in Virginia.



Bermudagrass (Cynodon dactylion)

Establishment: By sodding or planting sprigs. Sprigs should be planted (by hand or machine) when soil is warm in a well-prepared, moist seedbed. One end of the sprig should extend above ground, and the other should be covered by firmly packed soil.

Sources: Readily available as seed, sprigs, and sod.

6. Reed Canarygrass (Phalaris arundinacea)

Uses: Pasture, hay silage, and erosion control. An excellent grass for stabilizing waterways, healing and controlling gullies, and protecting shorelines of ponds and reservoirs from wave action. Also provides good cover for shooting preserves. Can be used in deep gullies and drainage ditches where streamflow is rapid. Vigorous growth may impede flow in small, low velocity channels.

Description: A long-lived, cool season, clumpy perennial with coarse rhizomes (underground stems). Grows 4 to 7 feet tall. Most widely used variety is Ioreed.

Adaptation: Throughout Virginia. Does best in a cool, moist climate. Makes best growth on fertile, moist, medium to fine soils; but will grow in a wide range of soil moisture conditions. Will also grow well on swampy or floodplain soils consisting of peat, muck or sand. Will withstand flooding, yet is quite drought-tolerant when mature. Optimum pH range 5.0 to 7.5.

Reed Canarygrass (Phalaris arundinacea)

Establishment: Requires a well-prepared seedbed that is firm and weed free. Seed in spring or late summer; drill seed alone or with a legume. Seed must be fresh - it should be labeled as having at least 70% germination tested within the last 6 months. Normally, pure stands should be established because this grass is not very compatible with other plants. Mowing should not occur more than twice a year on stabilized critical erosion areas or waterway as this will result in reduced stands.

Sources: Available commercially.

MISCELLANEOUS EROSION CONTROL GRASSES

1. Weeping Lovegrass (Eragrostis curvula)

Uses: Fast-growing cover for erosion control. In the northeast, weeping lovegrass acts as a summer annual. The normal life of 3 to 5 years may be foreshortened by low winter temperatures. May provide permanent cover on southern exposure.

Description: A rapid-growing, warm season bunch grass introduced from East Africa. The long, narrow leaves are numerous, very fine, and droop over to the ground, hence the name. Leaf height is rarely above 12 inches.

Adaptation: Prefers light-textured, well-drained soil; will thrive on soil of low fertility. Low winter temperatures may deplete stand.

Establishment: Easy to establish by seed; germinates rapidly and grows quickly. Lime and fertilizer needs are similar to those of Tall Fescue and Ryegrass. Requires pH of 5.5 or higher. May be planted any time after danger of frost and throughout the summer. Very fine seed, commonly added to erosion control seed mixtures. Use of hydroseeders is successful if the seeding rate is increased to compensate for the lack of a firm seedbed. Normal seeding rates are 5 to 20 lbs. per acre in mixes.

Sources: Readily available from large seed companies.

Weeping Lovegrass (Eragrostis curvula)

2. Redtop (Agrostis alba)

Uses: Erosion control, pasture, companion grass in turf seedings and stabilizing ditch and channel banks, grassed waterways, and other disturbed areas.

Description: A coarse, cool season perennial grass with rhizomes (underground stems). Grows to 30 to 40 inches.

Adaptation: Throughout Virginia; does better in the cool, humid areas. Will grow under a wide variety of soil and moisture conditions. Grows on very acid soils (pH 4.0 to 7.5) and poor, clay soils of low fertility. While drought-resistant, it is also a useful wetland grass.

Establishment: Has very small seed and requires a compact seedbed. May be sown in early spring or late summer. Seldom seeded alone except as temporary turf. Adequate fertilization is essential on critical areas to obtain good cover rapidly. Most commonly added to mixes, usually 2 to 3 lbs. per acre. Redtop will disappear from a stand under frequent low mowing.

Sources: Available from commercial sources.

Redtop (Agrostis alba)

LEGUMES

1. Crownvetch (Coronilla varia)

Uses: For erosion control of critical areas such as steep roadbanks, surface mine spoil and industrial waste areas. It is also useful as a residential ground cover. It provides high-quality forage for ruminant animals and serves as a wildlife food and cover plant.

Description: A deep-rooted, cool season, perennial, herbaceous legume with a semi-reclining growth habit. It reaches 2 to 3 feet in height, and does not climb or twine. It fixes nitrogen in the soil and makes a dense mat of vegetative cover.

Crownvetch (Coronilla varia)

Adaptation: Best adapted to the northern Piedmont and Mountain regions of Virginia. It grows best on well-drained soils with a pH range of 5.5 to 8.3. It will persist on more acid soils for a prolonged period once established. It is not adapted to soils with poor drainage. Crownvetch is winter-hardy and drought-tolerant. Varieties commonly used are Chemung, Penngift and Emerald.

Establishment: Only inoculated seed should be used. Requires at least 500 lbs. per acre of 5-10-10 fertilizer (or the area should be fertilized according to soil test results). Soil acidity must be raised above a pH of 5.5. Crownvetch requires mulch and can be hydroseeded successfully. Seeding in the spring is most successful. Frost-seeding may be used on steep or stony sites (seed in late winter, and allow frost action to work the seed into soil). Crownvetch often takes 2 to 3 years to establish a dense stand. A companion grass such as Perennial Ryegrass or Redtop needs to be mixed into the initial planting, but the Crownvetch will eventually crowd out the companion plants. It will not persist under frequent mowing.

Sources: Available commercially.

2. Flatpea (Lathyrus sylvestris)

Uses: Flatpea is an erosion control plant that provides a thick mat of vegetative cover, fixes nitrogen in the soil, and can be maintained with a minimum of management. It is useful on roadbanks, dams, borrow area, gravel pits, surface mine spoil, and industrial waste areas. It is an ideal plant for stabilizing logging roads and utility right-of-ways since it will restrict the invasion of many woody species. It also provides good wildlife cover and food.

Description: A cool season perennial legume. It will climb to a height of 6 to 7 feet if support is available, but the normal height is 2 to 3 feet.

Flatpea (Lathyrus sylvestris)

Adaptation: Flatpea is adaptable to a wide variety of soil conditions. It is drought-tolerant, cold-hardy, and does well on low-fertility sites such as sands, gravels, and soils from acid sandstones. It is not adapted to wet sites, but it will grow on somewhat poorly drained soils. It will tolerate minor shade and a minor degree of flooding. The optimum pH range is from 6.0 to 6.5. The only available variety is Lathco, developed by the USDA-Soil Conservation Service.

Establishment: Use only inoculated seed. The seedbed should be scarified, if possible. The seed is normally drilled or band seeded, but on rough sites or steep slopes, it can be broadcast and then worked into the soil by light dragging. Where possible, a light application of mulch, properly anchored, will assure a good stand. Lime is essential if the soil is below a pH of 5.0. Fertilize according to a soil test or apply 400 lbs. per acre of 10-20-10. Work lime and fertilizer into soil when preparing

the seedbed. For a primary stand, use a seeding rate of 30 to 40 lbs. in a mixture with 8 to 10 lbs. of Perennial Ryegrass or 10 to 15 lbs. of Tall Fescue. Flatpea is slow to germinate, so grasses are needed to provide quick cover. Early spring seedings in April or May are best; June seedings are less desirable. Grass seedings may be overseeded with Flatpea from November through March. Flatpea is usually not winter-hardy if seeded in mid or late summer; therefore, dormant seedings are recommended. Mulch with straw at a minimum rate of 1-1/2 tons per acre on all critical sites, and anchor. Little management is required. Remove woody vegetation if the site is invaded. Mowing is acceptable once the stand is established. Mow after full bloom at a 6-inch minimum height.

Sources: Lathco is commercially available.

3. Sericea Lespedeza (Lespedeza cuneata)

Uses: Hay, pasture, erosion control, cover crop, wildlife food.

Description: Warm season perennial legume with upright woody stems 12 to 18 inches tall. Roots widely branched penetrating soil 3 feet or more.

Adaptation: Well adapted to all parts of Virginia. Best on well-drained, deep soils of medium texture. Will also grow on sandy, rather acidic, infertile soils. Most often the legume of choice for eastern Virginia. Optimum pH range is 6.0 to 6.5, but will tolerate a range of 5.0 to 7.0. It is drought-tolerant. Common varieties in Virginia are Serala and Interstate.

Sericea Lespedeza (Lespedeza cuneata)

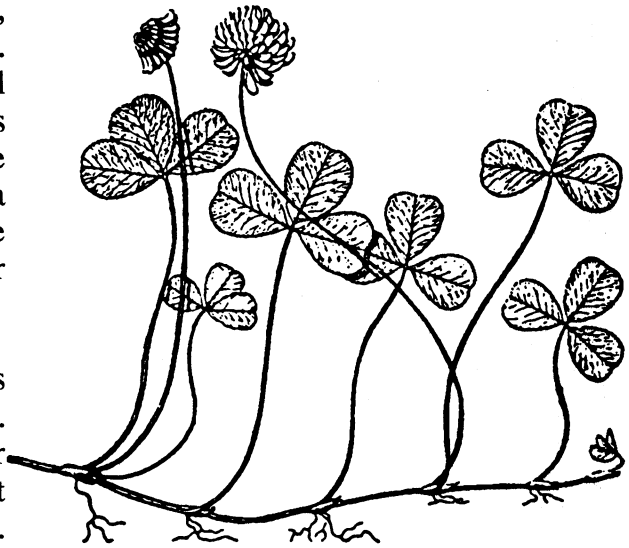
Establishment: Seed from April to June. Requires a firm seedbed. Use only inoculated seed. Rates vary from 20 to 30 lbs. of unhulled seed per acre. Requires phosphate and potash. Will not persist under frequent mowing (once a year recommended).

Sources: Seed of common varieties is commercially available.

4. White Clover (Trifolium repens)

Uses: Common White Clover is used mostly for pastures. Ladino clover, a giant white clover, is also used for hay and silage in mixtures with a grass. The thick-growing, spreading characteristics of the common type make it ideal for erosion control.

Description: A cool season perennial legume. The common type has a prostrate type of growth, while the Ladino is more upright. Both spread by stolons (horizontal branches along ground) and by roots at the nodes. Representative common varieties used in Virginia are Tillman, Common and White Dutch. Ladino is the only cultivar for the large type.



White Clover (Trifolium repens)

Adaptation: Thrives in cool climates and on moist, rich soils with full sun. Will not tolerate extremes of cold or drought. Where soil moisture is not adequate, Ladino is short-lived. Optimum soil pH is 6.5, but it will grow in a range of 5.0 to 7.5. Common White Clover volunteers readily in Bluegrass mixtures where moderate to high fertility is maintained. Stands are persistent.

Establishment: Ladino Clover requires inoculation, fertilizing, and liming for successful growth. Phosphorus and potash are the key fertilizer elements required. Ladino makes a good companion crop with grasses such as Orchardgrass, Bromegrass, Tall Fescue and Timothy. These grasses will normally crowd out the Ladino after 2 to 3 years. Seed should be planted (drilled or broadcast) at shallow depths, and a firm seedbed is desirable.

Sources: Available commercially.

APPENDIX 3.32-d

TABLE 3.32-F

LBS. OF GROUND AGRICULTURAL LIMESTONE* PER THOUSAND SQUARE FEET NEEDED TO CORRECT pH LEVEL OF ACID SOILS TO 6.5

Existing pH	Soil Texture		
	Sandy Loam	Loam	Clay Loam
6.2	20	35	40
6.0	40	55	70
5.8	55	65	85
5.6	70	80	105
5.4	90	100	125
5.2	105	120	140
5.0	120	140	160
4.8	125	180	205
4.6	155	210	230
4.0	200	250	300

* Lime should always be applied in accordance with the results of a soil test, such as may be obtained through the soil testing laboratory at VPI&SU or through a reputable commercial laboratory.

Source: DSWC's Basic Urban E&S in Virginia

Appendix H

NAVFAC Spill Response SOP (March 2006)

RESPONSE AND REPORTING OF OIL AND HAZARDOUS SUBSTANCE SPILLS
Standard Operating Practice

1. Purpose: The purpose of this SOP is to outline the procedures and responsibilities that shall be used by the NAVFAC MIDLANT Hampton Roads Public Works Departments, IPTs, and Business Lines doing work in the Hampton Roads AOR whenever an oil or hazardous substance spill occurs as a result of in-house or contracted operation.

2. Background: Oil and or hazardous substance spills can occur from MIDLANT operations. It is important that the command takes the proper action to contain, control, and report spills to protect personnel and the environment and comply with the CNRMA's region's spill policy.

3. Policy: NAVFAC MIDLANT Public Works Departments, IPTs, and Business Lines shall comply with COMNAVREG MIDLANT INSTRUCTION 5090.3 DATED 30 April 2004 or subsequent updates by responding to, cleaning up, and reporting spill that occur as a result of NAVFAC operations. The Environmental Business Line shall maintain corporate knowledge of spills that occur due to command operations, issue internal command guidance as needed, lead the investigation of significant spills, and resource a readiness capability to respond to spills when the Region determines a response or clean up is required.

4. Effective Date: 10 March 2006 (target)

5. Definitions:

Spill: A spill is an unauthorized release in any amount by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing of oil or hazardous substance into the environment (air, water, or land, including pavement). There is no minimum amount. Authorized releases are those permitted explicitly by agreement with the CNRMA Regional Environmental Group (Code N45) and expressly included in a work ticket or contract.

Oil: Includes fuels, lubricating oils and greases, hydraulic fluids, petroleum, mineral, and synthetic oils, electrical transformer oils, cooking grease and oils, and oily sludges.

Hazardous substance: For Navy reporting purposes: a hazardous substance is any solid, liquid, mixture, or vaporous substance that is identified is a hazardous or toxic material, or a waste. Sewage, sewage sludges, garbage, refuse, contaminated soil, and materials that mix and contaminate stormwater or potable water are consider reportable. Steam, potable water, or uncontaminated stormwater or groundwater is not considered a hazardous substance.

6. Enclosures:

1. Oil and Hazardous Substance Spills - Action Check List
2. Spill notification and message process
3. Message Template for Oil Spill
4. Message Template for Hazardous Substance Release

7. Specific Responsibilities:

a. The Spiller shall:

- Immediately notify the Installation's Emergency Dispatcher/ Emergency Communication Center (ECC) if you directly discover a spill or if your contractor reports a spill to you. Report what you know about the spill. See the attached Spill Action Check List and spill notification / message process.

MIDLANT

- Notify the NAVFAC MIDLANT Regional Operations Center, ROC (757-444-3477 or 757-445-6868) that a spill has occurred. The ROC may inform you that they have already been notified if someone outside of your operation discovered the spill.
- If trained in accordance with the OSHA HAZWOPER standard, ascertain the source of the spill and stop it, if it is safe to do so. Maintain overall safe control of the site. Expect the Fire Department to respond. The installation Environmental Office may also visit the site. Site control initially belongs to the Fire Department but could transfer to a Facility Incident Commander if the situation warrants.
- Clean up the spill if you have the appropriate resources and training to do so and can do so safely. The installation ECC may call the Fire Department. Follow the Fire Department direction because upon arrival they assume incident command and control. For contracted operations, the contractor is the financial responsible party for the cost of response, and cleaning up, and restoration of the site. NAVFAC MIDLANT is the responsible party for in-house operations. In the case of a contractor's operations, the contractor shall be made financially responsible. Any cleanup expenses incurred by the Region will be back charged to NAVFAC MIDLANT.
- For minor spills, remain on site through out the clean up operation. When operations are being done by contract, the contractor's safety officer shall remain on site. For NAVFAC MIDLANT in-house operations, the supervisor / foreman shall remain on site until clean up is complete.

b. The Construction PM or Spiller's Product Line Coordinator shall:

- Directly notify their chain of command via the "HEADs UP" reporting system. Note for some business lines this services is provided by the NAVFAC MIDLANT ROC.
- Generate a draft Navy Message to report the spill in accordance with the attached templates. Send the draft message within one business day of discovering the spill to the IPT Spill Coordinator. See the attached Spill notification and message process chart. For spills of 100 gallons and larger, the message should be send out within 24 hours. For spills that occur between 1400 on Fridays and before 1400 on Sundays, the NAVFAC MIDLANT Command Duty Officer shall draft and released the message. The NAVFAC MIDLANT CDO shall also draft and release spill messages for spills that occur on holidays.
- The ECC will call the National Response Center for spills that reach water. Secure the National Response Center case number and include in the navy message by calling the ECC.
- Maintain a back up person to handle spill notification when on leave or travel.
- Maintain your name on the HEADS UPs System Distribution List for the geographical area they serve.
- Note that the template for an oil spill and a hazardous substance spill are different. Send the draft spill message to the HR IPT's Spill Coordinator via email. Follow up message sit-reps are required if the spill cannot be contained and cleaned up within 24 hours.
- Support the EV Business Line during a spill investigation.

b. The IPT Spill Coordinator shall:

- Finalize the draft Navy spill notification message, and present up the chain of command for message release. Ensure the NAVFAC PWO and CNRMA N45 installation environmental storefront office, where the spill occurred, is copied on messages and follow up reports.
- Track spills status to determine if follow up reports are forthcoming. Arrange for follow up reports with Product Line Coordinators as appropriate.
- Maintain spill support back up when on leave or travel.
- Arrange for technical support as appropriate from the EV Business line to other Business Lines. Note: Operational support to respond to a spill is tasked from the Installation's Emergency Communications Center or the NAVFAC MIDLANT ROC or the EV Service Dispatch Desk.
- Assume Incident Commander duties or delegate to the IPT (OPHREV3) when requested by the Incident Commander for the spill response/oil recovery taskings. Upon request advise the Incident Commander and or the NOSC of the technical aspects of any spill tasking.

c. The EV Business Line: shall:

- Maintain a record of all spills that occur due to NAVFAC MIDLANT operations.

- Maintain environmental clean up capability 24/7 to respond to minor oil spills and hazardous substance releases on or from Navy property within a 50-mile radius of Norfolk.

- Conduct inquiree of any NAVFAC MIDLANT spill that exceeds 100 gallons and report findings to the CNRMA N45 NOSC and / or NNSY Code 106 as appropriate within seven calendar days. Support JAG investigations as requested.

- Functionally the EV Business Line supports the Region's request to articulate OBOS funding requirements for maintenance and repairs of oil spill equipment, manages and coordinates command support to the Region's Spill Management Team, funds special spill training for their employees to function on Facility and Regional Response Teams, participates in response exercises when funded, prepares an annual budget request on behalf of the Command for Region Spill Response support, provides internal technical spill management guidance, and conducts appropriate internal awareness training to IPTs, other business Lines, and Public Works Departments.

8. <u>Questions</u> about this policy should be directed to the EV Support Branch

OIL AND HAZARDOUS SUBSTANCE SPILLS ACTION CHECKLIST

Note: This SOP is based on COMNAVREG MIDLANT INSTRUCTION 5090.3 DATED 30 April 2004.

A Spill is: an unauthorized release of oil or hazardous substance in ***any amount*** by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting escaping, leaching, dumping or disposing of oil or hazardous substance in to the environment (air, water, or land, including pavement). There is no minimum amount. Authorized releases are those explicitly included in a contract and covered by permit.

When you discover a spill:

1. **Immediately notify the Installation's EMERGENCY COMMUNICATIONS CENTER (ECC)**

NNSY	396-3333	Ykt / CAX	887-4911	NAVSTA	444-3333
St. Js	396-3333	Camp Peary	757-229-2121	NSA	444-3333
St. Helena	396-3333	Ykt Fuels	887-4911	LCreek:	462-4444
Craney Is	322-9911	Sugar Grove	304-249-6399	Wallops Is	757-824-1333
Hospital	953-5777	Dam Neck	492-6302	Fort Story	422-7141
Northwest	421-8334	Oceana	433-9111	Harvey Point	252-426-5221

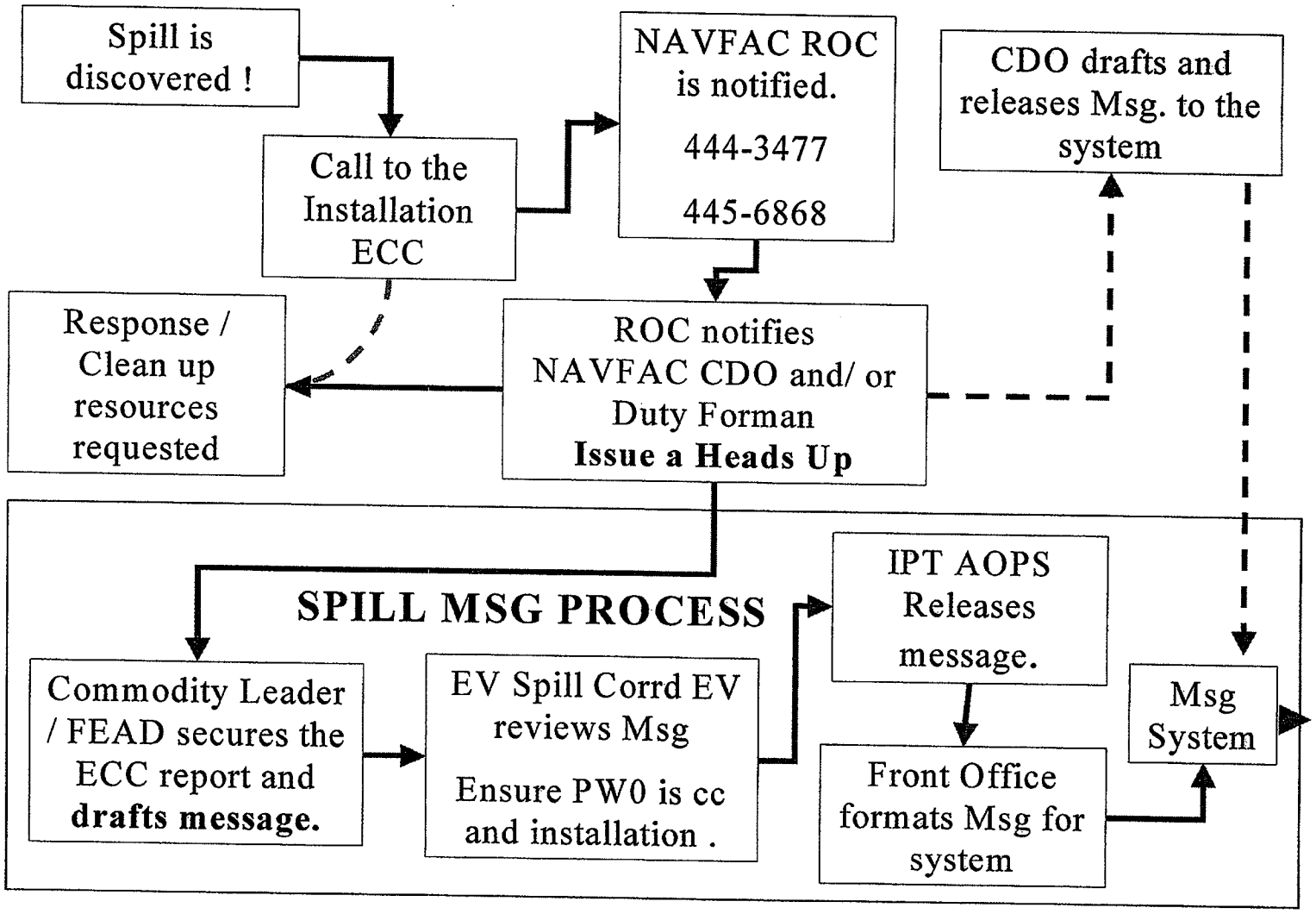
- If the spill is headed off base, or actually occurs off base, also call the CNRMA Regional Operations Center: 757-322-2607.

2. Then immediately notify the NAVFAC MIDLANT ROC (757-444-3477 or 757-445-6868)

3. If you are trained in accordance with the OSHA HAZWOPER standard, ascertain the source of the spill and stop it, if it is safe to do so. Maintain overall safe control of the site. The contractor is the financial responsible party for cleaning up of spill that results from contract operations. Expect the Fire Department to respond. The installation Environmental Office may also visit the site. Site control initially belongs to the Fire Department but may transfer to a Facility Incident Commander if the situation warrants. Contractors, ROICC, and shop personnel shall follow the direction of the Fire Department or Incident Commander.

4. Verify that the spiller (contractor or shop personnel) has adequate resources or has resources on the way to stabilize the situation. For oil releases, this could include oil booms, absorbents material, skimmers, vacuum trucks and trained personnel to deploy these resources. If the contractor or shop is slow to react or the resources appear inadequate, the Regional may deploy its in-house oil recover/ oil response unit. The contractor (via the PWD or Business Line) will be back charged for Regional expenses. If something has sunk, the contractor should mobilize equipment for salvage /recovery and, if applicable, submit a plan to the Region's NOSC for Coast Guard review and approval.

5. As soon as information is available on the spill situation, (1) ensure a "HEADs UP" report is issued via the HEADs Up system and (2) prepare and send a draft Navy spill message via email to the Spill Coordinator(s) located in the Hampton Roads IPT. The message should be sent within one business day of spill discovery. Follow up reports may be required if the spill cannot be contained and cleaned up within 24 hours. See attached message templates.


Spill is discovered !
Call to the Installation ECC
NAVFAC ROC is notified.
444-3477
445-6868
CDO drafts and releases Msg. to the system
Response / Clean up resources requested
ROC notifies NAVFAC CDO and/ or Duty Forman
Issue a Heads Up
SPILL MSG PROCESS
Commodity Leader / FEAD secures the ECC report and drafts message.
EV Spill Corrd EV reviews Msg
Ensure PW0 is cc and installation .
IPT AOPS Releases message.
Front Office formats Msg for system
Msg System

OIL SPILL TEMPLATE

FM: NAVFAC MIDLANT//
TO: COMNAVREGMIDLANT NORFOLK VA//N45//
NAVFAC ATLANTIC NORFOLK VA //EV//
COMNAVFACENGCOM WASHINGTON DC//ENQ-DP//
INFO: [HOST INSTALLATION] //00//
NAVFAC MIDLANT//[RESPONSIBLE PWD//
CNO WASHINGTON DC//N45//
CHINFO WASHINGTON DC//JJJ//
COMNAVSEASYSCOM WASHINGTON DC//00C//
NAVFAC MIDLANT//EV//
NFESC PORT HUENEME CA//424//
NAVPETOFF ALEXANDRIA VA//JJJ//
COMCOGARD SECTOR HAMPTON ROADS VA//JJJ//
COGARD NATIONAL RESPONSE CENTER WASHINGTON DC//JJJ//
UNCLAS//N05090//
MSGID/GENADMIN/ NAVFAC MIDLANT//
SUBJ/ **OIL SPILL REPORT**, [xx GALLIONS,/ Host Installation/location]
REF/A/DOC/OPNAVINST 5090.1B//
AMPN/REF A IS THE ENVIRONMENTAL AND NATURAL RESOURCES PROGRAM MANUAL
RMKS/1. LOCAL TIME AND DATE SPILL OCCURRED/DISCOVERED:
2.FACILITY ORIGINATING SPILL: [list the name of your NAVFAC operation or business line and list contractor's name if spill occurred from a contractor's work.]
3. SPILL LOCATION:
4. VOLUME SPILLED IN GALLONS:
5. TYPE OF OIL SPILLED:
6. OPERATION UNDERWAY WHEN SPILLS OCCURRED/DISCOVERED:
7. SPILL CAUSE:
8. SLICK DESCRIPTION AND MOVEMENT:
9. SPILL ENVIRONMENT
   A.WEATHER: CLEAR.
   B.PREVAILING WINDS:
   C. AIR AND WATER TEMPERATURE:
   D. SEA STATE:
   E.TIDE:
10. AREAS DAMAGED OR THREATENED: [list body of water of natural resource affected]
11. TELEPHONIC REPORT TO NATIONAL RESPONSE CENTER [WAS /WAS NOT] MADE. (Contact the Installation's Environmental Office or the Installation ECC to see they made a call to the NRC. NAVFAC is not to make this call. The Host Activity decides when to make this call and can provide you with the reference call number.) , CONTROL NUMBER XXXXXX, POC:
12. SAMPLES [WERE/WERE NOT] TAKEN. [list location is samples were taken]
13. CONTAINMENT METHOD USED: [list those taken or planned]
14. SPILL CLEAN UP METHOD: [list those taken or planned]

15. VOLUME OF PRODUCT REMOVED IN GALLONS: [Indicate volume or weight of pure product recovered. Also indicate the amount of contaminated product recovered with whatever it was mixed with, i.e. soil or water]
16. PARTIES PERFORMING SPILL REMOVAL:
17. FEDERAL, STATE, OR LOCAL REGULATORY ACTIVITY DURING THIS INCIDENT: [list name of any agency that may have come to the spill site, usually 'NONE']
18. ASSISSTANCE REQUIRED/ADDITONAL COMMENTS:
19. LESSONS LEARNED: [How could this have been prevented?]
20. ACTIVITY CONTACT FOR ADDITIONAL INFORMATION: [Provide FEAD's, AROICCs, or Business line POC's phone number and email address]
BT
NNNN

HAZARDOUS SUBSTANCE SPILL TEMPLATE

ADMINISTRATIVE MESSAGE
ROUTINE
R ZYB
FM: NAVFAC MIDLANT//
TO: COMNAVREGMIDLANT NORFOLK VA//N45//
NAVFAC ATLANTIC NORFOLK VA //EV//
COMNAVFACENGCOM WASHINGTON DC//ENQ-DP//
INFO: [HOST INSTALLATION] //00//
NAVFAC MIDLANT//[RESPONSIBLE PWD//
CNO WASHINGTON DC//N45//
CHINFO WASHINGTON DC//JJJ//
COMNAVSEASYSCOM WASHINGTON DC//00C//
NAVFAC MIDLANT//EV//
NFESC PORT HUENEME CA//424//
COMCOGARD SECTOR HAMPTON ROADS VA//JJJ//
COGARD NATIONAL RESPONSE CENTER WASHINGTON DC//JJJ//
UNCLAS//N05090//
MSGID/GENADMIN/ NAVFAC MIDLANT//
SUBJ/ **HAZARDOUS SUBSTANCE RELEASE REPORT**/[quantity in gallons and installation location, e.g. 40 GALLIONS, YORKTOWN NAVAL WEAPONS STATION, YORKTOWN, VIRGINIA.]
REF/A/DOC/OPNAVINST 5090.1B//
AMPN/REF A IS THE ENVIRONMENTAL AND NATURAL RESOURCES PROGRAM MANUAL
RMKS/1. LOCAL TIME AND DATE RELEASE OCCURRED/DISCOVERED:
2. FACILITY ORIGINATING RELEASE: [list the name of your NAVFAC operations or business line and list contractor's name if spill occurred from a contractor's work.]
3. RELEASE LOCATION:
4. VOLUME SPILLED IN GALLONS OR OUNCES:
5. TYPE OF SUBSTANCE RELEASED: [list name of hazardous material, note for reporting purposes sewage is considered a hazardous substance.]
6. TYPE OF OPERATION AT THE SOURCE OF RELEASE: [construction, repair shop, waste pumping, waste conveyance, etc.]
7. RELEASE CAUSE:
8. TYPE OF CONTAINER FROM WHICH SUBSTANCE ESCAPED:
9. RELEASE ENVIRONMENT
   A.WEATHER: CLEAR.
   B.PREVAILING WINDS: N/A
   C. AIR AND WATER TEMPERATURE: N/A
   D. SEA STATE: N/A
   E.TIDE: N/A
10. AREAS DAMAGED OR THREATENED:
11. NOTIFICATIONS MADE AND ASSISTANCE REQUESTED: [indicate if the ECC was called and if the NRC call was made by the ECC.]
12. FIELD TESTING: [indicate the findings and conclusions as to concentration, pH, etc.]
13. CONTROL AND CONTAINMENT ACTIONS: [list actions taken or planned]
14. CLEAN-UP ACTIONS PLANNED/TAKEN: [list actions taken or planned]

15. AMOUNT OF SUBSTANCE RECOVERED: [volume/ weight]
16. PARTIES PERFORMING CONTAINMENT/CLEAN-UP ACTIVITIES:
17. FEDERAL, STATE, OR LOCAL REGULATORY ACTIVITY DURING THIS INCIDENT: [list name of any agency that may have come to the spill site. usually 'NONE']
18. ASSISSTANCE REQUIRED/ADDITONAL COMMENTS:
19.LESSONS LEARNED: [How could this have been prevented?]
20. ACTIVITY CONTACT FOR ADDITIONAL INFORMATION: [Provide FEAD's AROICCs, or Business line POC's phone number and email address]
BT
NNNN

Appendix I

Stormwater Pollution Prevention Plan

Storm Water Pollution Prevention Plan
For Construction Activities

<table>
<tr><th colspan="4">1.0 SITE DESCRIPTION</th></tr>
<tr><td rowspan="3">1.1 Project Title and Location: (Latitude and Longitude or Address)</td><td>LANTDIV RAC IV,
CTO – 0120, SWMU-14 Asphalt Cover - Removal Action,
Naval Station Norfolk
Norfolk, VA

Contract Number
N62470-02-D-3260</td><td rowspan="3">1.2 Operator's Name and Address:</td><td>Shaw E & I.,
500 E. Main St.,
Suite 1630,
Norfolk, Virginia
23510</td></tr>
<tr><td>Lat: 36.962° N</td><td></td></tr>
<tr><td>Lon: 76.323° W</td><td></td></tr>
<tr><td>1.3 Description: (Purpose and Types of Soil Disturbing Activities)</td><td colspan="3">The removal action at SWMU-14 of Naval Station Norfolk is being conducted to mitigate potential human health risks presented by contamination in the soil from past operations. This action will involve placing an asphalt cover over the entire area of the site which will serve as a much needed parking lot for NSN and prevent exposure to future receptors. Construction at the site (land disturbing activities) will be limited to: Site preparation, installation of stormwater drainage system, installation of underground conduit and light pole concrete footers, installation and grading of subgrade and aggregate base material, installation of bioretention basins, asphalt cover placement, and site restoration for purposes of this SWPPP.

Refer to the Project Schedule provided in Appendix A of the Work Plan for the intended sequence and timing of activities that disturb soils at the site.</td></tr>
<tr><td>1.4 Runoff Coefficient:</td><td colspan="3">Runoff coefficient prior to and during construction: 0.10-0.30
Runoff coefficient after construction activities are complete: 0.70-0.95</td></tr>
<tr><td>1.5 Site Area:</td><td colspan="3">Asphalt Paving Area ~approximately 15 acres</td></tr>
<tr><td colspan="4">1.6 Sequence of Major Activities:</td></tr>
<tr><td colspan="4">1.6.1 Site Preparation – This task will consist of receiving temporary facilities, equipment, and materials; locating subsurface utilities; establish a support and lay-down area; set up site controls and signage; install temporary construction entrance (see project specifications and Construction Drawings provided in Appendix B of the Work Plan); and installation of Phase-I erosion and sediment controls (refer to Construction Drawings provided in Appendix B of the Work Plan). Shaw will install access roads as appropriate within the limits of the site to enable vehicular access and construction equipment to move throughout the area.

1.6.2 Installation of Stormwater Drainage System - Subsurface drainage piping and associated drain basins will be installed as shown in the Construction Drawings included as Appendix B of the Work Plan. Sections of trench will be opened and bedding material will be placed at the bottom of the trench. After placing bedding material and compacting, the piping will be installed to the grades and slopes indicated in the Construction Drawings included as Appendix B of the Work Plan. The trench will then be backfilled to the specified grade and compacted.</td></tr>
</table>

For the excavated basin areas, an impermeable liner will be placed at the bottom, the perforated HDPE piping and catch basins will be installed, and the basin will then be backfilled with gravel to the specified elevation and covered with filter fabric creating a temporary sediment trap that will remain in place until completion of the aggregate base course preparation. The appropriate inlet and outlet drainage protection will be installed as the installation of each section of drainage system is completed. Rip-rap and other materials will be imported as needed to construct these features.

1.6.3 **Installation of Underground Conduit and Light Pole Concrete Footers** - Trenching will be conducted to provide direct burial installation of appropriately sized conduit as detailed in the project specifications. Following conduit installation the trenches will be backfilled to the specified grade and compacted. Shaw will excavate as necessary in preparation for placement of the light pole concrete foundations (see Construction Drawings provided in Appendix B of the Work Plan). After placing the foundations and connecting conduit as needed, the disturbed areas will be backfilled to the specified grade and compacted.

1.6.4 **Installation and Grading of Subgrade and Aggregate Base Material** - Initially this will include removal of surface vegetative layer, grading to subgrade, and compaction of subgrade. Haul trucks will then transport aggregate base course to the site and place as per the Construction Drawings provided in Appendix B of the Work Plan. The material will be graded to meet desired elevations. A smooth-drum vibratory roller will be utilized to compact each lift as it is placed and graded.

1.6.5 **Installation of Bioretention Basins** - The temporary sediment basins discussed above in Section 1.6.2 will be converted to permanent bioretention basins. Each sediment basin will be dewatered and the accumulated sediment will be removed from the filter fabric layer. The area will be filled with engineered soil mix filter media, mulch, etc. in accordance with site restoration discussed below in Section 1.6.7 and as shown on the Construction Drawings provided as Appendix B of the Work Plan.

1.6.6 **Asphalt Cover Placement** - This task will include mobilization of an asphalt paving contractor to place the asphalt pavement for the asphalt cover (parking lot). All features of the parking lot pavement including entrances, exits, roadways, and parking areas will be installed.

1.6.7 **Site Restoration** - Site restoration will include: Landscaping and vegetation repair; parking lot striping; removal of temporary E&S controls; and completion of the final as-built survey.

1.7 Name of Receiving Water(s):	The Elizabeth River and the “unnamed” lagoon to the south east of the site will be the primary receptors of storm water runoff at SWMU-14 for CTO #120. The “unnamed” lagoon flows into Willoughby Bay.

2.0 CONTROLS

2.0.1 **Site Preparation** – During site preparation activities, Shaw will install Phase-I erosion and sediment (E&S) controls throughout the site per the Construction Drawings provided in Appendix B of the Work Plan. Controls such as temporary sediment traps, construction entrances, decontamination pads, silt fencing, bio-socks/tubes, diversion dikes, and poly-sheeting to cover material stockpiles will be implemented and maintained as necessary throughout the life of the project to prevent and/or minimize erosion and migration of sediment.

2.0.2 **Installation of Stormwater Drainage System** – The embankment around the temporary sediment traps will be seeded if necessary to promote temporary vegetation after installation and silt fence will be placed upgradient. Remaining construction activities will be carried out in such a manner that erosion and water pollution will be minimized. Inlet and outlet protection will be installed for the drainage system as each section is completed.

2.0.3 **Installation of Underground Conduit and Light Pole Concrete Footers** – All controls discussed above will be left in place during this activity and additional silt fence and/or bio-socks/tubes will be placed upgradient of the newly disturbed areas as necessary.

2.0.4 **Installation and Grading of Subgrade and Aggregate Base Material** – Stripping of the existing sod layer and grading activities will be done in a phased approach to minimize the necessary controls. As existing soils are graded and moved throughout the site, E&S controls and temporary drainage features will be maintained and added as necessary throughout the site per the Construction Drawings in Appendix B of the Work Plan. Excavated and graded site soils will be reused on site as much as possible. Dust suppression measures, such as use of a water truck, will be utilized as needed.

2.0.5 **Installation of Bioretention Basins** – Prior to asphalt cover placement, all temporary sediment traps will be converted to permanent bioretention basins per the Construction Drawing in Appendix B of the Work Plan. Silt fence will be placed upgradient to minimize sheet flow into the bioretention basins. All necessary concepts and calculations supporting the bioretention system are provided as Attachment A and were extracted from the *Design Basis Report Q-Area Asphalt Cover* (CH2M Hill, 2008).

2.0.6 **Asphalt Cover Placement** – During asphalt placement, controls discussed in the above sections will be left in place as needed. Silt fence will remain around the perimeter of the site and the inlet/outlet protection for the drainage system will remain in place. These controls will be actively maintained until final stabilization.

2.0.7 **Site Restoration** - Upon completion of asphalt cover activities, the disturbed area will be landscaped as appropriate (i.e. planting trees and shrubs, hydro-seeding, placement of stone, mulch, paving repairs, etc.) Unpaved areas that may be impacted include the support area, lay-down area, and Base roadways adjacent to the site. Landscaping activities will be completed for the bioretention basins as required. This may include placement of mulch and planting of grass, shrubbery, or trees. This will be done in accordance with the project designs/specifications. The silt fence and inlet/outlet protection will be maintained and remain in place until adequate vegetation has been re-established in the disturbed areas and by the approval of the FEAD.

During the above listed activities, all E&S controls will be inspected during each workday and after every significant precipitation event. Sediment that has collected will be removed and any necessary repairs will be made promptly following detection.

2.1 Erosion and Sediment Controls	
2.1.1 Stabilization Practices	Any existing vegetation will be preserved where attainable and the disturbed portions will be stabilized. Landscaping of all unpaved disturbed areas will be performed as part of Site Restoration activities to establish permanent vegetative cover and will include: Planting trees and shrubs, hydro-seeding, placement of stone, mulch, paving repairs, etc. (per the Construction Drawings in Appendix B of the Work Plan).
2.2 Major Grading Activities	
Major grading activities will be accomplished in a phased approach. Phase I E&S features will be installed prior to grading and will be upgraded to Phase II E&S features to remain in place until vegetative cover and permanent features have been established and approval to remove the features has been received from FEAD. These activities are anticipated to be performed as appropriate and as indicated in the Construction Drawings in Appendix B of the Work Plan.	
2.2.1 Structural Practices	Silt fence will be installed around the perimeter of SWMU-14 to prevent sediment migration. Rainwater will be diverted to the sediment traps/bioretention basins from the site due to the design grade of the area. If necessary, silt fence and/or bio-socks/tubes may be installed to disrupt concentrated sheet flow to existing drainage areas and reduce runoff velocity. The stormwater drainage system will carry the run-off to the Elizabeth River and to the “unnamed” lagoon. Appropriate protection will be provided at each inlet and outlet of the drainage system. Structural practices will be maintained and remain in place until adequate vegetation has been re-established in the disturbed areas and by the approval of the FEAD.
2.3 Storm Water Management	
The primary pollutant in the storm water will be suspended solids. The discharge of suspended solids will be controlled by placing sediment traps/bioretention facilities (per the Construction Drawings in Appendix B of the Work Plan), silt fencing and/or bio-socks/tubes around the site to capture any suspended solids. Additionally, appropriate protection will be provided at each inlet and outlet of the drainage system. All controls will be properly selected, installed and maintained in accordance with manufacturer specifications (if applicable) and good engineering practices/best management practices.	
2.4 Other Controls	
2.4.1 Solid Waste Disposal:	Waste characterization and disposal facility approval will be completed prior to commencing removal activities. All transportation trucks will be inspected to ensure that tailgates are secure and they are in proper and safe operating condition. In the event isolated landfill debris is uncovered during initial grading activities, it will be segregated, contained in drums/roll-off box, and characterized for proper offsite disposal to a licensed disposal facility. All transportation trucks will be inspected to ensure that tailgates are secure and they are in proper and safe operating condition. Any general trash generated at the site will be placed in a roll-off box/dumpster for disposal at a local landfill.

2.4.2 Offsite Vehicle Tracking:	An existing road will serve as the entrance to the site and will be enhanced with a construction entrance per the Construction Drawings in Appendix B of the approved Work Plan and project specifications. Prior to equipment leaving the site, it will be properly decontaminated and thoroughly cleaned on the temporary decontamination pad. Vehicle tires will be cleaned prior to leaving the site as needed. This will prevent vehicles from tracking soil offsite.
2.4.3 Sanitary Waste Disposal	Sanitary wastes will be generated at the site by the port-a-john. These wastes will be removed by a licensed vendor and properly disposed.

2.5 TIMING OF CONTROLS/MEASURES

1.) Upon mobilization, silt fencing will be installed around the perimeter of the site.

2.) Phase I and Phase II Controls will be installed per the Project Schedule provided as Appendix D of the Work Plan and per the Construction Drawings in Appendix B of the Work Plan.

3.) The erosion and sediment controls will be inspected during each workday and after every significant precipitation event and documented in the daily field log. Repairs or upgrades identified will be implemented as soon as reasonably possible.

4.) An inspection report form will be completed every 7 days and within 48 hours of a rainfall event of ½" or more.

*Inspections will be conducted by qualified personnel (Responsible Land Disturber)

2.6 Erosion and Sediment Control Inspection and Maintenance Practices

Prior to beginning any disturbance of the land, erosion and sediment controls will be installed at the site. The erosion and sediment controls will be inspected and documented each workday and after every significant precipitation event. Shaw will complete any needed repairs promptly following detection. Additional controls will be installed in the event the installed system is not sufficient or there is a change in the site conditions. The E&S features included in Phase I and Phase II will be installed in accordance with the Construction Drawings provided in Appendix B of the Work Plan.

2.7 Non-Storm Water Discharges	
It is expected that the following non-storm water discharges will occur from the site during the construction period:	
☐Discharges from fire fighting activities ☒Waters used to wash vehicles where detergents are not used ☐Potable water sources including waterline flushings ☐Routine external building wash down which does not use detergents ☒Air conditioning condensate ☐Foundation or footing drains where flows are not contaminated with process materials such as solvents	☐Fire hydrant flushings ☒Water used to control dust ☐Water used for hydrostatic testing of new pipeline construction ☐Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used ☐Uncontaminated ground water or spring water

2.8 INVENTORY FOR POLLUTION PREVENTION PLAN

The following materials or substances are expected to be present on site during construction:

- One 250-Gallon capacity diesel fuel tank
- Gasoline (5 gallon containers)
- Hydraulic Fluid
- Spill-response Kit (absorbents)
- Grease Tubes
- Bio-degradable Cleaning Products
- Port-a-jon Chemical Solution
- Silt Fencing/Bio-socks/tubes
- Concrete Pipe
- HDPE Pipe
- Common Fill Material
- Aggregate
- Topsoil
- Mulch
- Seed
- Fertilizer

1. An inventory of construction and maintenance material will be kept onsite
2. MSDS sheets will be available
3. All materials will be properly stored and covered in approved locations
4. Liquid materials will be properly containerized, stored and labeled

2.9 Material Management Practices

2.9.1 Good Housekeeping:	Good housekeeping measures have been developed to ensure that areas of the facility that contribute or potentially contribute pollutants to storm water discharges (e.g., areas around trash dumpsters and storage areas) are maintained in a clean and orderly manner. Good housekeeping measures include measures to eliminate or reduce exposure of garbage and refuse materials to precipitation or runoff prior to their ultimate disposal. Typical good housekeeping measures include activities that are performed on a daily basis by employees during the course of normal work activities.

2.9.2 Hazardous Products:	Not Applicable (It is not anticipated that any hazardous products will be encountered on site). All subgrade soil that is to be regraded is believed to be non-hazardous.
2.10 Product Specific Practices	
2.10.1 Petroleum Products:	Shaw will implement all reasonable precautions to prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Equipment and storage vessels containing oils and fuels will be visually inspected prior to site entry and daily thereafter for leakage, drips, or other preventable releases. Any equipment or vessel damage will be immediately repaired or removed from the site. Releases of oily wastes will be remediated upon observation and impacted materials disposed of appropriately. Shaw will immediately notify the Navy of any oil spills. The site will be equipped with a spill kit, sufficient to contain and clean up on-site quantities of petroleum products. Fuel containers will be properly stored and the diesel tank will be provided with secondary containment.
2.10.2 Fertilizers:	Fertilizers will be used as part of the site restoration planting activities. Fertilizers will be applied and stored per the manufacturer's recommendations and will not be brought on site until needed.
2.10.3 Paints:	Paint will be used for the parking lot striping. Shaw will contract a qualified pavement striping company to paint lines as required. All paint will be applied and stored per the manufacturer's recommendations and will not be brought on site until needed.
2.11 Spill Control Practices	
Spills may include solid or liquid materials being mishandled, dumped, leaked, knocked over, etc. Any material spillage will be immediately contained and collected for subsequent disposal. Excavation will be performed such that exposed source materials remain within the limits of excavation. Any spilled liquids will be contained and collected by appropriate means. The site will be equipped with a spill kit, sufficient to contain and clean up onsite spills. Shaw will immediately notify the Navy of any spills.	
3.0 SITE MAP	
Refer to Appendix B of the Work Plan for all applicable construction drawings.	

POLLUTION PREVENTION PLAN CERTIFICATION	
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
Signature	Date

CONTRACTOR'S CERTIFICATION			
I certify under penalty of law that I understand the terms and conditions of this Virginia Pollutant Discharge Elimination System (VPDES) general permit VAR10 that authorizes the storm water discharges from the construction activity identified as part of this certification.			
Signature	Title	Date	Company Name, Address, and Telephone Number
Brooke Mouzain	Engineer	05/27/2008	Shaw E&I 500 Main Street Suite 1630 Norfolk, Virginia 23510

PROJECT_____

STORM WATER POLLUTION PREVENTION PLAN

INSPECTION REPORT FORM

To Be Completed Every 7 Days and Within 48 Hours of a
Rainfall Event of 1/2" or More

INSPECTOR:_____ DATE:_____

INSPECTOR'S QUALIFICATIONS_____
_____

DAYS SINCE LAST RAINFALL_____
AMOUNT OF LAST RAINFALL_____INCHES

AREA INSPECTED (areas not finally stabilized, material storage areas, and areas where vehicles enter/exit the site)
_____
_____

INCIDENCES OF NON-COMPLIANCE	**CORRECTIVE ACTION TAKEN**	**BY WHOM**	**WHEN COMPLETE**
LOCATION(S) OF DISCHARGES OF SEDIMENT OR OTHER POLLUTANTS FROM THE SITE			
LOCATION(S) OF BMP THAT NEED TO BE MAINTAINED			
LOCATION(S) OF BMP THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR LOCATION			
LOCATION(S) WHERE ADDITIONAL BMP IS NEEDED THAT DID NOT EXIST AT TIME OF INSPECTION			

Incidences of noncompliance were not identified and the facility is in compliance with the storm water pollution prevention plan. I certify under penalty of law that this attachment was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNED_____DATE_____

PROJECT_____

STORM WATER POLLUTION PREVENTION PLAN

CHANGE(S) REQUIRED TO THE STORM WATER POLLUTION PREVENTION PLAN_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

REASON(S) FOR THE CHANGE(S)_____
_____
_____
_____
_____
_____
_____

I certify under penalty of law that this attachment was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNED_____DATE_____