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RESOURCE CONSERVATION AND RECOVERY ACT INTERIM CORRECTIVE MEASURE WORK PLAN UNEXPLODED ORDNANCE 1 (UXO 1) SOLID WASTE MANAGEMENT UNIT 77 (SWMU 77) SOIL REMOVAL NAVAL ACTIVITY PUERTO RICO

05/01/2015

RIGHT WAY ENVIRONMENTAL CONTRACTORS, INC

Final

RCRA Interim Corrective Measure Work Plan
UXO 1 (SWMU 77) Soil Removal

NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PR

May 2015

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Contract Number N62470-12-D-7016, CTO JM01

Final

RCRA Interim Corrective Measure Work Plan

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May 2015

Prepared for:

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Prepared by:

USA Environmental, Inc.
Cape Environmental Management, Inc.
Right Way Environmental Contractors, Inc.

Prepared Under:

Contract Number N62470-12-D-7016, CTO JM01

RCRA INTERIM CORRECTIVE MEASURE WORK PLAN

UXO 1 (SWMU 77) SOIL REMOVAL

NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PR

May 2015

I hereby certify that the enclosed Work Plan, shown and marked in this submittal, is that proposed to be incorporated with Contract Number N62470-12-D-7016, Contract Task Order JM01, "*Multiple Awards Indefinite Delivery Indefinite Quantity (IDIQ) Range Sustainment, Military Munitions Response; Environmental Compliance & Remediation Services Contracts Scope of Work for UXO 1 (SWMU 77) Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, PR.*" This Work Plan is in compliance with contract specifications, Occupational Safety and Health Administration requirements, United States Army Corps of Engineers, Safety and Health Requirements Manual (EM 385-1-1, 15 Sept 08), and is submitted for Government approval.

Reviewed By:

05/20/2015

Project Manager — Date

5/20/2015

Quality Control Manager — Date

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B Drawings and Specifications
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D Storm Water Pollution Prevention Plan
E Site Safety and Health Plan
F Explosives Safety Submission

Attachments

1 Sampling and Analysis Plan (Separately bound)
2 Biological Assessment (To be provided)

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ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
bgs	Below Ground Surface
BMP	Best Management Practices
BRAC	Base Realignment and Closure
CFR	Code of Federal Regulations
CRZ	Contamination Reduction Zone
CTO	Contract Task Order
CY	Cubic Yards
DDESB	Department of Defense Explosive Safety Board
DHS	Department of Homeland Security
DOT	Department of Transportation, United States
EM	Engineers Manual
EPA	Environmental Protection Agency, United States
EPCRA	Emergency Planning and Community Right-to-Know Act
EPP	Environmental Protection Plan
ESS	Explosive Safety Submission
EZ	Exclusion Zone
H&S	Health & Safety
IAW	in accordance with
IDW	Investigation Derived Waste
LEPC	Local Emergency Planning Committee
MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
mg/kg	Milligrams per Kilogram
MPPEH	Material Potentially Presenting an Explosive Hazard
NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NG	Nitroglycerin
NPDES	National Pollutant Discharge Elimination System
NRC	National Response Center
NSRR	Naval Station Roosevelt Roads
OB/OD	Open burn/Open detonation
OSHA	Occupational Safety and Health Administration
PgM	Program Manager
PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
PQCP	Project Quality Control Plan
PR	Puerto Rico

PRG	Preliminary Remediation Goal
QC	Quality Control
QCM	Quality Control Manager
RCRA	Resource Conservation and Recovery Act
RDC	Regional Dispatch Center
RFI	RCRA Facility Investigation
RFP	Request for Proposal
RPM	Remedial Project Manager
RWEC	Right Way Environmental Contractors Inc.
SAP	Sampling and Analysis Plan
SAR	Small Arms Range
SE	South East
SIP	Sistema Integrado de Permisos
ft^2	Square Feet
SM	Site Manager
SPCC	Spill Prevention Control and Countermeasure
SM	Site Manager
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SSR	Site Summary Report
SUXOS	Senior UXO supervisor
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
yd^2	Square Yards
SZ	Support Zone
TBD	To be Determined
TSDF	Treatment, Storage and Disposal Facility
TCLP	Toxicity Characteristic Leaching Procedure
µg/L	Micro-grams per Liter
U.S.	United States
USACE	United States Army Corps of Engineers
USA	USA Environmental, Inc.
USA Team	USA Environmental, Inc. and subcontractors Cape Environmental Management Inc. and Right Way Environmental Contractors Inc.
UXO	Unexploded Ordnance
WMP	Waste Management Plan
WP	Work Plan
XRF	X-ray Fluorescence

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1.0 INTRODUCTION

This Work Plan (WP) has been prepared for the Naval Facilities Engineering Command Southeast (NAVFAC SE) under Contract Number N62470-12-D-7016, Contract Task Order (CTO) JM01. The purpose of this CTO is to perform soil removal at Naval Activity Puerto Rico (NAPR) UXO 1 (SWMU 77).

This WP was prepared in accordance with EPA's RCRA Corrective Action Interim Measures Guidance (EPA/530-SW-88-029). This project is completed in accordance with applicable sections of the federal regulations, including Title 29 of the Code of Federal Regulations (CFR) describing Occupational Safety and Health Standards. Coordination with the applicable federal, state, and local agencies is necessary to ensure field activities comply with substantive requirements of any applicable permits.

This WP includes a Project Schedule in Appendix A, Drawings and Specifications in Appendix B, a Waste Management Plan (WMP) in Appendix C, a Storm Water Pollution Prevention Plan (SWPPP) in Appendix D, a Site Safety and Health Plan (SSHP) in Appendix E, and an Environmental Protection Plan (Section 8). Also, the UFP-SAP is included as Attachment 1 and the Biological Assessment is included as Attachment 2.

1.1 INTERIM CORRECTIVE MEASURE OBJECTIVE

The objective of the interim corrective measure is to excavate soil contaminated with antimony, arsenic, copper, lead, and zinc to the lateral and vertical limits presented within the scope of work and shown in Appendix B, thus controlling or abating threats to human health and the environment.

1.2 SCOPE OF WORK

The interim corrective measure consists of antimony, arsenic, copper, lead, and zinc contaminated soil removal. The scope of work includes the following:

- Pre-construction activities
- Treatability Testing
- Mobilization and Site Preparation
- Site Surveys
- Temporary facility construction
- Temporary environmental controls
- Soil excavation
- On-site soil stabilization
- Post stabilization confirmation sampling
- Waste Transportation and disposal
- Site cleanup
- Demobilization.

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2.0 SITE CONDITIONS

Originally established in 1941 as Fort Bundy, the base was commissioned in 1943 as a Naval Operations Base and redesignated as Naval Station Roosevelt Roads (NSRR) in 1957. NSRR operated as a Naval Station until March 31, 2004, when NSRR underwent operational closure. Based on the ceasing of military operations, the name for NSRR was changed to NAPR on April 1, 2004. Currently, NAPR occupies more than 8,600 acres on the east coast of Puerto Rico, along Vieques Passage with Vieques Island lying approximately 10 miles to the east (Figure 2-1).

2.1 SITE LOCATION

UXO 1 (also known as SWMU 77) is located on the peninsula at Punta Medio Mundo on the northeastern boundary of NAPR, Ceiba, Puerto Rico. SWMU 77 covers approximately 66 acres and historically was used as a small arms range. SWMU 77 consists of six subareas: the current Pistol Range Subarea, Former Pistol Range Subarea, Rifle Range Subarea, Potential Open Burn/Open Detonation (OB/OD) Subarea, Potential Munitions Trench Subarea, and the Detonation Area Near Concrete Pad Subarea. The small arms range which consisted of the Rifle Range and Pistol Range subareas were closed on January 1, 2010. This work plan covers the interim corrective measure at three subareas: the Former Pistol Range Subarea, the Pistol Range Subarea, and the Rifle Range Subarea. Locations of each SWMU 77 Subarea included in the interim corrective measure are depicted in Figure 2-2. The OB/OD Subarea and the Potential Munitions Trench Subarea were not included in the interim corrective measure because the Phase I RFI at these subareas were inconclusive and required more investigations at the time the interim corrective measure was contracted. For the Detonation Area Near Concrete Pad Subarea, there were no unacceptable human health risks and high uncertainty in the ecological risk estimates. For this Subarea, RCRA corrective action interim measures have been deferred until additional characterization as part of the supplemental RFI can be conducted.

2.2 SITE BACKGROUND

In 2011, a Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at SWMU 77 identified four areas with high soil lead concentrations as a result of previous military range use. Previous investigations and site work identified Munitions and Explosives of Concern (MEC) at the site; however, no MEC was identified during the RFI field investigation. The Phase I RFI recommended conducting a Full RFI at SWMU 77. Background information, as presented in the Full RFI Sampling and Analysis Plan (SAP), for each of the four subareas at SWMU 77 is discussed below.

2.2.1 FORMER PISTOL RANGE SUBAREA

The Former Pistol Range Subarea is overgrown with trees and no visible evidence remains of the former pistol range located northeast of the current pistol range and southwest of the Detonation Area Near Concrete Pad Subarea. The Phase I RFI investigated surface soil for nitroglycerin (NG) and metals along each side of the subarea to investigate potential historical berm locations and inside the perceived historical range boundaries. The Phase I RFI found that at the berm, lead concentrations were elevated and presented a human health and ecological risk. The most highly contaminated area was encountered in the northwestern area of the subarea (TetraTech, 2012).

2.2.2 PISTOL RANGE SUBAREA

The Pistol Range Subarea is located in a level area north of the entrance road to SWMU 77. The Pistol Range was closed January 1, 2010 and until that time was maintained via grass cutting. An earthen berm that served as the bullet backstop is present just beyond the target area. There are six firing lines across two 50-foot-wide side-by-side ranges. The southern half of the range was used exclusively since 2004. The Phase I RFI investigated surface soil for NG at the firing lines and metals and explosives at the berm area. The Phase I RFI found that at the berm, lead concentrations were elevated and presented a human health and ecological risk (TetraTech, 2012).

2.2.3 RIFLE RANGE SUBAREA

The Rifle Range Subarea is a 500-yard narrow feature centrally located in SWMU 77 and orientated such that shots are fired toward the outer point of the peninsula. Construction of the range occurred sometime between 1940 and 1958, and it was closed for use on January 1, 2010. The range has 100-yard, 200-yard, 300-yard, and 500-yard elevated firing lines and a short-yardage range formerly used as a pistol range. The short-yardage range is located just in front of a fixed target berm. The target berm consists of a constructed earthen berm that served the short-yardage range, a concrete wall at the rear of the earthen berm equipped with a target carrier mechanism to raise and lower targets, and a natural steeply wooded hillside beyond the earthen berm/concrete wall that serves as the rifle range backstop for these elevated targets. The Phase I RFI investigated surface soil for NG at the firing lines and metals and explosives at the berm/embankment area. NG was a potential risk concern at the 200-yard firing line for the Rifle Range. At the earthen constructed berm area/wooded embankment, lead was present at elevated concentrations (TetraTech, 2012).

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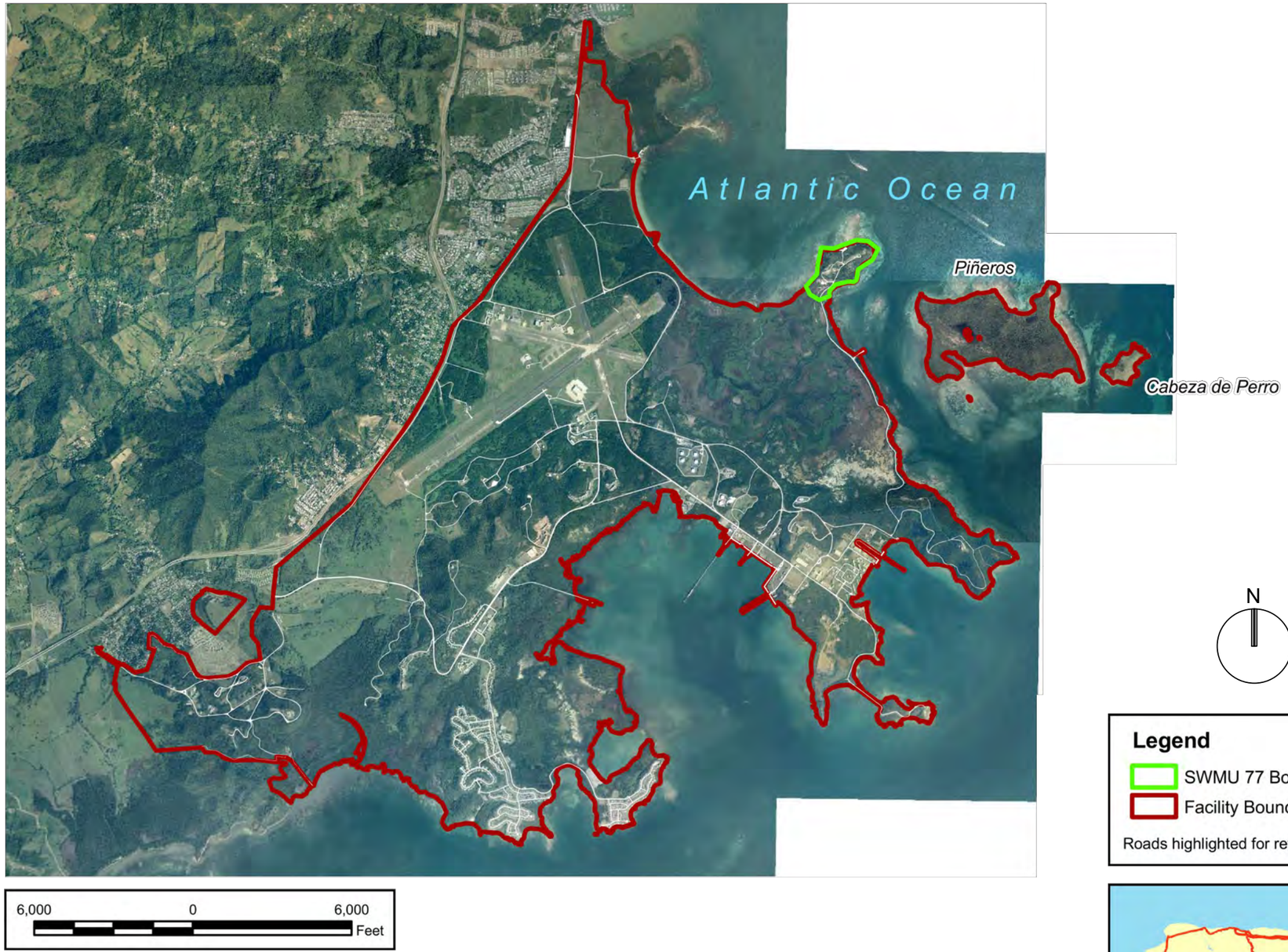

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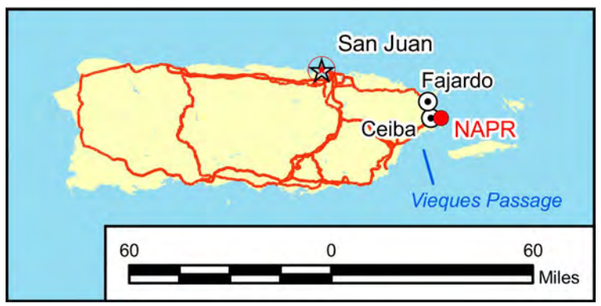
Legend

SWMU 77 Boundary

Facility Boundary

Roads highlighted for reference purposes.



SYM	DESCRIPTION	DATE	APPR

NAVFAC

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<CO>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SITE LOCATION MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 2-1 OF 2

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SWMU 77 Fig1.dwg LAYOUT NAME: 1 PLOTTED: Friday, June 28, 2013 - 5:33pm USER: crios

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500 250 0 500 Feet

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SYM	DESCRIPTION	DATE	APPR

NAVFAC

CAPE
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Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<XX>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SWMU 77 SUBAREA MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 2-2 OF 2

DRAWFORM REVISION: 12-May-15

FILE NAME: Z:\OCONUS\Federal\NAVYPACIDI\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SI\SWMU 77 Fig2-2.dwg LAYOUT NAME: Fig 2 PLOTTED: Tuesday, May 12, 2015 - 11:01am USER: crios

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3.0 PROJECT ORGANIZATION

Table 3-1 contains project personnel, subcontractors, and their contact information.

Table 3-1: Project Personnel and Subcontractors

Position	Name	Telephone Number
Naval Facilities Engineering Command – Atlantic		
Remedial Project Manager (RPM)	Stacin Martin	(757) 322-4780
Activity Point-of-Contact (POC)	Pedro Ruiz	(757) 286-9139
Base Realignment and Closure Project Management Office – South East		
Contract Specialist (CS)	Debbie Sanders	(843) 743-2145
USA Environmental, Inc.		
Program Manager	Doug Ralston	(813) 500-1099
Project Manager	Brian Mattingly	(513) 846-0826
Site Manager/Senior Unexploded Ordnance Supervisor	Gerald Braddock	(417) 247-7484
Cape Environmental Management Inc.		
Quality Control Manager	Golnaz Ashouri	(404) 388-1003
Site Safety and Health Officer	Robert Hernandez	(210) 452-8929
Right Way		
Vice-president	Pedro Tejada	(787) 630-9881
Subcontractor	**Address/ Contact Name**	**Responsibility**
Waste Management of Puerto Rico Inc. "El Coqui Landfill"	Carlos Villanueva (939) 969-4878 cvillanueva@wM.com	Waste Disposal
Fraticelli Trucking Company, Inc.	Eduardo Fraticelli (787) 836-1610	Transportation

A discussion of the roles of key project personnel is provided in the sections that follow. If changes to key personnel are required, USA Environmental, Inc. and subcontractors Cape Environmental Management Inc. and Right Way Environmental Contractors Inc. (RWEC) ("the USA Team") will discuss the proposed change(s) with the Navy prior to making the change(s). The following management organization has been assembled to execute the project tasks.

3.1 PROJECT MANAGER

The Project Manager (PM) reports directly to the Program Manager (PgM). The PM is responsible for the overall execution of the project. The DPM, with oversight from the PM, is responsible for the following:

- Execution of the CTO for overall conformance to NAVFAC South East (SE) requirements and specifications, with respect to technical, cost, and schedule issues;
- Review of CTO submittals to ensure contract compliance; Interaction and coordination with the Remedial Project Manager (RPM), Activity Point-of-Contact (POC)regulatory bodies, and other stakeholders;
- Management of all field construction activities, including directing project staff and subcontractors in accordance with the contract requirements and site-specific WPs;
- Tracking, documenting, and reporting proposed changes to the scope of work for the project;
- Direct communication with NAVFAC SE regarding project execution and accountability;

- Coordination with the project Quality Control Manager (QCM) to ensure compliance with standard protocols and procedures and implementation of the WP;
- Coordination with the Site Safety and Health Officer (SSHO) and NAVFAC SE to ensure implementation of the SSHP;
- Assigning personnel consistent with contract and CTO requirements; and
- Ensuring compliance with federal, state, and local regulations and requirements as appropriate.

3.2 SITE MANAGER/SENIOR UNEXPLODED ORDNANCE SUPERVISOR

The Site Manager (SM)/Senior Unexploded Ordnance Supervisor (SUXOS) reports directly to the PM and/or DPM. The SM/SUXOS ensures that work at the site is performed in a safe manner and in accordance with the approved project WP and SSHP. Specifically, responsibilities as the SM/SUXOS will include the following:

- Field implementation of the CTO, including day-to-day operations;
- Documenting all activities in the daily Contractor Production Report;
- Oversight of field crews and ensuring that project tasks are completed according to the scope of work (SOW);
- Oversight of UXO construction support activities;
- Sequencing subcontractors into work areas; and
- Working with the PM to plan day-to-day site activities.

3.3 QUALITY CONTROL MANAGER

The Quality Control Manager (QCM) reports directly to the Director of Quality and Safety. The QCM ensures that work is performed at a high level of quality to satisfy the objectives of the interim corrective measure following the three-phase control system. The three-phases of control are the core of the Construction Quality Management System and are the means by which the USA Team ensures that construction, including that of subcontractors and suppliers, complies with the requirements of the contract. The three-phase control system will be conducted by the QCM for each definable feature of work (DFW). A DFW is a task that is separate and distinct from all other tasks and has a specific set of control requirements. The three-phase control system consists of a preparatory phase, an initial phase, and a follow-up phase. During the preparatory phase, the QCM reviews the specifications and drawings to ensure all preparatory steps have been taken, verifies that submittals have been prepared and reviewed, ensures qualified manpower has been assigned, verifies that testing controls are prepared and in place, and ensures safety issues have been identified and addressed. During the initial phase the QCM documents the completeness and acceptability of particular items at the beginning of the work activity after a representative portion of the items have been completed. During the follow-up phase the QCM gears inspections and testing toward a level of effort to verify the continuation of project compliance and the standards of workmanship established during the previous two phases. Responsibilities as QCM will include the following:

- Developing and delivery of Daily Quality Control Reports;
- Performing and maintaining three phases of control for each phase of work, to ensure that work complies with contract requirements;
- Performing inspections, tests, and periodic quality control meetings at the Sites to track and report progress.
- Ensuring compliance with federal and local regulations and requirements as appropriate.

3.4 SITE SAFETY & HEALTH OFFICER (SSHO)

The Site Safety & Health Officer (SSHO) reports directly to the Director of Quality and Safety. The SSHO ensures the proper implementation of the SSHP. Specifically, responsibilities will include the following:

- Serving as the primary field POC;
- Oversight and enforcement of the SSHP, including stop-work authority;
- Serving as the main POC for any onsite emergency;
- Ensuring compliance with project-specified safety and health requirements, Federal and Occupational Safety and Health Administration (OSHA) regulations, as well as the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1, USACE 2008);
- Supporting the duties as the onsite Environmental Manager.

3.5 CONTRACTOR

Contractor information for the USA Team is as follows:

Company Name:	USA Environmental, Inc.
Address:	720 Brooker Creek Boulevard, Suite 204 Oldsmar, Florida 34677
Primary POC:	Mr. Brian Mattingly bmattingly@usatampa.com (513) 846-0826 office phone

The site supervision, inspection, and approval of all work is the responsibility of the USA Team. The USA Team adheres to the procedures identified in the Scope of Work (SOW) and follows the procedures, quality control (QC), and site safety protocols designated therein. However, as lead contractor, USA Environmental, Inc. has the overall responsibility for supervision of the work and direction of its subcontractors and is responsible for the inspection and approval of all work. Contact information for the USA Team, NAVFAC SE, BRAC, and subcontractor personnel are provided in Table 3-1.

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4.0 REGULATORY FRAMEWORK

According to the Phase I RFI, although originally slated for transfer to the Department of Homeland Security (DHS) for continued use as an active range, the DHS declined future ownership of SWMU 77. In accordance with the Consent Order agreement voluntarily entered into between the Navy and USEPA on January 29, 2007, a Phase I RFI was required to determine whether hazardous waste, solid waste, and/or hazardous constituents were present at SWMU 77. The purpose of the Phase I RFI was to generate field data to determine if interim response actions or future remedial investigation was appropriate. The Phase I RFI recommended to move forward with a Full RFI to further characterize and delineate soil contamination as well as perform intrusive investigations to investigate subsurface anomalies (TetraTech, 2011). In 2012, a Full RFI was initiated which included the collection of surface and subsurface soil samples at each of the subareas. Based on the concentrations of metals in soil, the RFI Report (draft in progress) recommends conducting interim corrective measures soil removal to address soil likely posing unacceptable risks (CH2MHill, 2013b). This Work Plan presents the removal action that will be conducted as part of the RCRA corrective actions interim measures recommended in the Full RFI.

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5.0 PROJECT REQUIREMENTS

5.1 PRE-MOBILIZATION PROJECT REQUIREMENTS

Pre-mobilization project requirements include submitting the following plans:

- Interim Corrective Measure Work Plan (this plan)
- Health and Safety Plan (Appendix E)
- Project Schedule (Appendix A)
- Waste Management Plan (Appendix C)
- Storm Water Pollution Prevention Plan (Appendix D)
- Explosives Safety Submission (Appendix F)
- Drawings and Specifications (Appendix B)
- Environmental Protection Plan (Section 8.0)
- Sampling and Analysis Plan (Attachment 1)

5.2 FIELD WORK PROJECT REQUIREMENTS

Following approval of pre-mobilization plans, field work is initiated. The field work project requirements include:

- Temporary construction facilities
- Mobilization
- Site work
- Site Cleanup/Demobilization

5.3 POST FIELD WORK PROJECT REQUIREMENTS

Following construction completion, the post field work project requirements include:

- Construction Completion Report
- As-built Construction Drawings.

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6.0 PRE-CONSTRUCTION ACTIVITIES

The following pre-construction items or activities are satisfied or in-place before the commencement of any fieldwork.

6.1 PERMITS, LICENSES AND NOTIFICATIONS

Operations are performed in compliance with all applicable federal regulations. In addition, the work is performed to meet with the substantive requirements of state or local laws, rules, and regulations.

The USA Team will conduct work in accordance with the *2013 Biological Assessment (BA) for RCRA Corrective Action Interim Measures Site UXO (SWMU 77) – Small Arms Range, Naval Activity Puerto Rico, Ceiba, Puerto Rico,* included as Attachment 2, and will notify the RPM in the event unusual site conditions are encountered, such as the observation of suspect endangered species, the unearthing of suspected artifacts, human remains, and/or the discovery of suspected Munitions and Explosives of Concern (MEC) and Material Potentially Presenting an Explosive Hazard (MPPEH). The USA Team also notifies the RPM if structural damage occurs to surface features and adjacent structures.

The USA Team obtains all necessary permits and applicable permit fees. The necessary permits include an Office of Government general permit, a CEST (erosion control) and an air permit (fugitive dust permit).

A general permit is obtained from the Government of Puerto Rico through their integrated permit office or Sistema Integrado de Permisos (SIP). The general permit includes the DS-3, a Fugitive Dust Permit, and an Erosion Control Permit. Additionally, a National Pollutant Discharge Elimination System (NPDES) General Permit following California Standards is required. In accordance with contract requirements, the SWPPP (Appendix D) has been prepared to comply with California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit). California's General Permit is more stringent than Puerto Rico's General Permit; therefore, the SWPPP will meet and exceed Puerto Rico SWPPP requirements.

6.2 SAFETY REQUIREMENTS

The USA Team will be responsible for the health and safety (H&S) of all employees and subcontractors working at the site and will follow the applicable reference guidance documents, including:

- USACE Safety and Health Requirements Manual, EM 385-1-1 (USACE 2008);
- OSHA Guidance Manual for Hazardous Waste Site Activities, National Institute for Occupational Safety and Health / OSHA / United States Coast Guard / EPA;
- 29 CFR 1910, OSHA, General Industry Standards; and
- 29 CFR 1926, OSHA, Standards for Construction.

The USA Team will implement H&S measures upon arrival to the Site and throughout fieldwork. Work will be performed, at a minimum, in Level D and Modified Level D personal protective equipment (PPE). Higher levels of PPE may be used, as determined to be appropriate by the onsite SSHO, and will be upgraded in accordance with USA Environmental's Safety and Health Program. The SSHP specifies the necessary monitoring, inspection, controls, training, reporting, and communication for this project. The SSHP also includes appropriate activity hazard analyses. All persons working at the Site will be required to read the SSHP and sign an acknowledgement verifying their understanding of the plan prior to their participation in any onsite work.

In addition all work is overseen by unexploded ordnance (UXO) technicians whose qualifications are in accordance with Department of Defense Explosive Safety Board (DDESB) Technical Paper 18 (TP-18). If encountered, all UXO is managed in accordance with NAVSEA OP 5, Volume 1 Ammunition and Explosives Safety Ashore and the approved ESS.

6.3 PRE-CONSTRUCTION SUBMITTALS

All pre-construction submittals are provided and approved prior to commencing field activities. Pre-construction submittals consist of the WP, which includes the Environmental Protection Plan, project schedule, drawings and specifications, WMP, SWPP, and SSHP. Internal Draft, Agency Draft, and Final pre-construction submittals will be submitted to the RPM. The WP also includes the 2013 UFP-SAP prepared by CH2M Hill for confirmation sample collection.

6.4 SECURITY

Access to site excavation areas is controlled and limited to authorized personnel only. These controlled areas are closed off with temporary construction fencing, silt fencing, and signs. Visitors will not be allowed into the Site without prior permission from the USA Team's PM or the SM.

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7.0 SITE WORK

The following is performed as part of field activities.

7.1 MOBILIZATION AND SITE PREPARATION

Once all pre-construction activities are completed the USA Team will first mobilize the SUXOS to conduct on-site coordination for site access, soil removal operational areas, and to engage local support providers. The SUXOS mobilization will occur approximately one week prior to commencement of field activities. Following SUXOS mobilization, personnel and equipment required for execution of field activities for soil excavation, soil stabilization and disposal, and site restoration tasks will mobilize to the site.

The following will be completed prior to beginning excavation:

- The USA Team will install temporary construction fencing and pedestrian control signs, caution tape, and or warning signs, as necessary, to delineate the work area and protect surrounding personnel from project activities. Initial work zone boundaries will include the following: Exclusion Zone (EZ), including restricted and regulated areas; Contamination Reduction Zone (CRZ); and Support Zone (SZ). The work zone boundaries will be established to meet the BA requirements for the protection of ecological resources.
- The USA Team will set up temporary shelter (a canopy) on site for breaks, worker relief and shelter from unexpected weather conditions.
- Sanitary provisions such as a portable lavatory will be provided onsite during field activities.
- The USA Team will set up dust control and air monitoring measures. Dust will be primarily controlled at the work site using water spray application. Details for required air monitoring protocols and personnel monitoring are described in the SSHP included as Appendix E.
- The USA Team will set up an access control point and health and safety facilities (first aid, eye wash station, etc.).
- The USA Team will establish survey control points for the construction and as built surveys.
- The USA Team will install Best Management Practices (BMPs) as appropriate to for proper erosion control.
- The USA Team will provide dumpsters for solid waste.

7.2 CLEARING AND GRUBBING

Before vegetation clearing begins each day, a survey will be conducted in accordance with the BA included as Attachment 2. The USA Team will then clear and grub vegetation at each SWMU 77 subarea, only in locations indicated on Figure 3 of the BA. All vegetation will either be removed from the site or mulched and spread only in designated areas of subarea soil disturbance as shown on Figure 3 of the BA (CH2MHill, 2013a).

7.3 UTILITY CLEARANCE

According to the RFP, there are no utilities present at the removal action site. The USA Team will perform utility mark-outs prior to the start of site activity to verify the presence or absence of utilities. The utility mark-out includes contacting the Puerto Rico Public Service Commission to determine if any utilities in their program are on site. If the Puerto Rico Public Service Commission indicates utilities are present, a site walk will be scheduled with a Puerto Rico Public Service Commission representative to complete a utility mark out.

7.4 SITE SURVEY

The USA Team will utilize a Commonwealth of Puerto Rico-licensed surveyor to conduct a survey of the boundaries of the allowable soil and vegetation disturbance areas and the excavation areas prior to of the initiation field work.

7.5 SAMPLING AND ANALYSIS

7.5.1 PRE-STABILIZATION SAMPLING AND ANALYSIS

Prior to mobilization, one soil sample will be collected from the subarea with the highest lead concentration and will be placed into a decontaminated 5-gallon container. According to Section 10.5 in the Full RFI SAP, the highest lead concentration was observed in the wood embankment located at the Rifle Range Subarea (lead at 118,000 mg/kg). Collecting soil from an area with the observed of highest lead concentration will ensure that the most conservative stabilization mix ratio will be determined. The sample will be taken to Jaca Sierra laboratory (a geotechnical laboratory) in Trujillo Alto, Puerto Rico, to perform treatability testing and to establish mix ratios for the stabilizing reagent that is added.

Upon receipt of the sample at Jaca Sierra laboratory, the sample will be homogenized and analyzed for total solids, pH, bulk density, total lead, and TCLP lead. Approximately three or four aliquots consisting of approximately 300 grams each of the homogenized soil will be mixed with a variety of reagents known to be effective for the chemical fixation of lead. These reagents will include Portland cement, cement kiln dust, and hydrated lime. Each aliquot will cure overnight and then will be analyzed for TCLP lead. Stabilization testing will be considered successful for aliquots which have TCLP lead results below the TCLP limit of 5.0 mg/L. A report documenting the results of the treatability study will be provided to PREQB and EPA prior to initiating stabilization measures.

7.5.2 STABILIZATION STUDY

The composite soil sample collected prior to mobilization is homogenized and an aliquot of the soil sample is removed and analyzed for total and TCLP metals to determine the baseline concentrations of the metal residues. Portions of the homogenized sample are mixed with a reagent known to be effective for the chemical fixation of lead. These reagents include bentonite mixed with Portland cement or cement kiln dust. Four distinct reagent/waste addition levels are prepared for each reagent system. The mix ratio is initially based on the specific chemical and physical properties of the sample material and adjusted based on the outcome of treatability sample testing. Sample collection, mixing and testing is performed by RWEC. Once the stabilization study is complete, a ‘confirmation’ sample will be collected and submitted to Puerto Rico Environmental Quality Laboratories, Inc.(an environmental laboratory) to confirm that the stabilized soil meets the disposal requirements.

7.5.3 POST-STABILIZATION TCLP SAMPLING AND ANALYSIS

Once the stabilization agent applied to the excavated soil has been given adequate time to react, a sample will be collected to determine if the stabilized soil meets waste acceptance criteria as established by the landfill. The stabilization agent will be reapplied as necessary until the soil is determined to meet waste acceptance criteria. A sample analyzed for the full TCLP suite will be collected for every 5,000 tons of solid waste generated in accordance with the receiving facility’s disposal criteria. Complete waste characterization sampling details are included in the Waste Management Plan (Appendix C).

7.6 TEMPORARY CONSTRUCTION FACILITIES

7.6.1 CONTRACTOR PARKING

The USA Team will coordinate with the RPM to establish a parking area for contractor use.

7.6.2 PROTECTION AND MAINTENANCE OF TRAFFIC

This section details the traffic control procedures that may be required during the field work at the Site. Employees may be exposed to vehicle impact hazards during the project. To control these hazards, the following safety requirements will be strictly enforced.

- Seat belts will be worn any time a vehicle is in motion, regardless of speed or distance to be traveled. Seat belt requirements also apply to the operation of backhoe and other construction equipment.
- The posted speed limit and local traffic laws will be followed at all times.
- Vehicles will never be operated at a speed that is unsafe for the conditions (i.e. road surface, traffic, visibility, weather, etc.).

Ingress and egress routes will be marked and secured via locked gate prior to commencing work at the site. The routes will be clearly delineated and controlled as needed to minimize public and field personnel hazards prior to field activities. Where appropriate and possible, the ingress and egress routes will be separate to minimize hazards and maximize efficiency. The haul route is shown on Figure 7-1. Due to the remote location of SWMU 77, pedestrian foot traffic will be limited to only essential construction personnel. The essential personnel will be actively working within the construction areas and will not be entering or leaving the work area during active construction. Therefore, no pedestrian corridors will be established.

Transportation schedules will be managed in a way as to minimize the interference of surrounding activities and vehicular traffic patterns.

7.6.3 LAYDOWN AREA AND FIELD OFFICE FACILITIES

Laydown areas will be established at the Pistol Range Subarea and at the Rifle Range Subarea near the short yardage position. Soils excavated from the Former Pistol Range Subarea will be direct loaded into off road 24 CY dump trucks and transported to the Rifle Range Subarea were the Main Soil Stabilization Work area will be constructed. Soils removed from the Pistol Range Subarea may be staged next to the removal area in a temporary laydown area. If a temporary laydown area is used, the area will be prepared by constructing a berm and placing 30 mil poly sheeting on the ground. Additionally, the stockpiled soils will be covered with 6 mil poly sheeting if rain is forecasted. These soils will then be transported to the Main Stabilization Work area so that they can go through the soil stabilization process.

7.6.4 DECONTAMINATION FACILITIES AND PROCEDURES

The decontamination facilities will be installed during site preparation phase. The decontamination facility will be constructed at the small arms range (SAR) to be used for equipment and personnel decontamination. The decontamination facility delineates the support zone from the CRZ. All areas beyond the CRZ are considered the hot zone and cordoned off as required with temporary safety fencing and proper signage. Additionally, the USA Team will construct an equipment decontamination pad with one layer of 30 mil high density polyethylene HDPE and crushed stone and bermed on all sides with sandbags.

Personnel decontamination facilities will consist of a change-out area where the workers remove PPE and a wash station. Site personnel performing the remediation activity will be trained and medically monitored in compliance with the requirements of OSHA 29 CFR1910.120. Only one set of equipment will be used within the contaminated areas. The equipment will be dry decontamination using shovels and brushes while within the contaminated areas and no work will be conducted during wet weather. Once work in each subarea has been completed, and prior to when equipment is demobilized from the site, the equipment will be placed on the decontamination pad and power washed. Additionally, equipment will be transported via truck between each subarea. Water collected from the decontamination facility, including the wash station, will be collected, sampled and characterized for disposal at a permitted facility in accordance with the Waste Management Plan.

Vehicles and trucks used for transport will not enter the hot areas; personnel entering on foot will use disposable boot covers in order to prevent migration of contaminants.

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SYM	DESCRIPTION	DATE	APPR

NAVFAC

SEAL

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<CO>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

TRUCK ROUTE

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 7-1 OF 1

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SWMU 77 Fig1.dwg LAYOUT NAME: 1 PLOTTED: Friday, June 28, 2013 - 5:33pm USER: crios

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7.6.5 STABILIZATION AREA CONSTRUCTION

A 50 ft. by 90 ft. stabilization area will be constructed in the rifle firing range adjacent to each removal area at the SAR prior to excavation activities. The stabilization area will be bermed to prevent storm water runoff from entering the area. The floor will be covered with 30-mil HDPE liner, and the staged material will be covered using 6-mil liners. Excavated soils will be hauled to the stabilization area using 24 CY articulated trucks. The trucks will be unloaded onto the lined area where the stabilization agent is applied. Soils will initially be mixed with the designed stabilizing agent using excavators and dozers. Then rototillers will be used to ensure proper mixing of the soil and the stabilizing agent are achieved. Water may also be added, as needed, during the mixing process. XRF will also be used during the stabilization process to monitor the stabilization progress on a daily basis. Based on XRF data, once the soils achieve satisfactory lead levels, fixed based laboratory samples will be collected to confirm soil stabilization. For every 5,000 tons, one full suite TCLP sample will be collected for disposal requirements and for every 1,000 CY one TCLP lead sample will be collected to ensure stabilization is achieved. At the conclusion of all soil excavation and treatment and during the stabilization area decommissioning, the stabilization area will be over excavated to a depth of 3 inches as a proactive preventative measure in the event the liner is puncture during construction. The excavated soil from the stabilization area will remain in the footprint of the stabilization area and will be treated with the stabilization agent prior to disposal.

7.7 TEMPORARY ENVIRONMENTAL CONTROLS

Erosion control measures will be implemented at the SAR prior to excavation. Storm water will be controlled by the use of BMP such as silt fences, temporary diversion ditches, dikes, and slope drains, as needed, to prevent the release of contaminated sediment through precipitation. Straw bales will be placed at the perimeters of all sloped project work areas and around staging areas that handle contaminated materials. As a BMP, the control measures will be monitored and maintained continually during the lifecycle of the project. Monitoring and maintenance of the control measures will be conducted by Right Way. Erosion control measures are presented in the SWPPP included as Appendix D.

7.8 SOIL EXCAVATION

For each of the subareas located and staked by a Puerto Rico-licensed surveyor, the soil will be excavated, mechanically sifted, then transported on site to the stabilization area, stabilized using a stabilization agent, and loaded for transportation and disposal as special waste. The soil will be excavated in a grid pattern sequenced to prevent re-contamination. Excavation work will begin in the grid furthest from the entrance into the work area and/or at the most upgradient location and excavation work will continue back towards the work area entrance and/or the most downgradient area. This convention will prevent foot or vehicle traffic from entering a completed grid. Similarly, as work progresses downgradient, runoff will travel from completed grids to uncompleted grids. Once excavation is completed in a grid, that grid will be flagged to distinguish the completed grids to protect the area from being contaminated by the site traffic. All excavations are completed in 1-foot lifts. Intermediate restoration measures such as slope reduction and erosion control will be implemented to ensure safe working conditions and reduce erosion. For this project slope stability is not a concern due to the shallowness of the excavations. According to the risk assessment performed by CH2M Hill, the contamination is 3 ft below ground surface (bgs) or shallower. Excavation at the Rifle Range Subarea also includes removing a 10 foot tall berm to grade. Figures 7-2 through 7-5 illustrate the locations and anticipated depths of the excavations by subarea. The actual footprint of excavation and quantities of soil excavated may vary as our understanding of the extent of contamination is refined, but the in situ total of 10,057 CY will not be exceeded. Currently, it is anticipated that excavations will occur at the Former Pistol Range Subarea, the Pistol Range Subarea, and the Rifle Range Subarea.

In accordance with the UFP-SAP, following the excavation, soil samples will be collected along the floor at 15-foot spacings and along the sidewall at 100-foot spacing for field XRF screening of the five metals. CH2M Hill will collect confirmatory soil samples for offsite analysis when XRF data suggest residual concentrations are at or below the PRGs. If there are exceedances of PRGs in the initial confirmatory samples either through field screening or off-site analysis, an additional 1 foot vertical excavation (if exceedance was in a floor sample) or an additional lateral excavation extending 15 feet into the sidewall (if

the exceedance was in a sidewall sample) will be performed. CH2M Hill will collect secondary confirmatory samples. In the event the secondary confirmation samples exceed PRGs, the NAVFAC representative, RPM, and Contracting Officer will be informed to determine if additional interim corrective measures are warranted (CH2M Hill, 2013b).

7.8.1 MEC CONSTRUCTION SUPPORT

In accordance with the SOW MEC is not anticipated to be encountered however, MEC construction support will be provided for all phases of field work including site setup, vegetation clearing and grubbing, and all intrusive activities. Prior to the start of field work activities a UXO technician II (UXOTII) or higher performs an instrument aided visual survey of the ground surface in the area where work will be conducted. The UXOTII also provides anomaly avoidance for surveyors staking out work areas and for the installation of erosion and sediment controls.

During excavation activities the UXOTII provides construction support. Prior to the excavation of a grid, the UXOTII will survey the area marking the location of any detected subsurface anomaly with a pin flag. Excavation of the grid will proceed as normal utilizing heavy equipment until the activity advances to within 1-foot of a pin flag indicating the presence of a subsurface anomaly. The UXOTII will excavate the anomaly utilizing hand tool IAW with approved ESS. Once the anomaly has been cleared excavation with heavy equipment may resume. All excavations will be conducted in 1-foot lifts. Insofar as MEC is not anticipated to be located during this field activity, description of demolition and processing of Material Potentially Presenting and Explosive Hazard (MPPEH) or Material Documented as Safe (MDAS) is not included in this work plan. However, if MEC/MPPEH is discovered it will be addressed in accordance with the ESS and applicable regulations.

7.9 ON-SITE SOIL STABILIZATION

The excavated soil will be transported to the stabilization area at the rifle range and stockpiled. The stockpiled soil will be covered and bermed to prevent runoff and run-on. The engineered stabilization agent capable of stabilizing lead and other metals in soil and effectively reducing their leachability to meet disposal criteria will be blended with the soil. The reagent dosage is determined based upon treatability study results. The stabilization agent will be applied at a rate sufficient to ensure that the TCLP leachability of metals in the treated soil passes the universal treatment standards in accordance with the land disposal restrictions for RCRA. Once the stabilization agent has been given adequate time (Typically 8 to 24 hours) to react with the soil, a sample will be collected to determine if the stabilized soil meets waste acceptance criteria as established by the landfill. The stabilization agent is reapplied as necessary until the soil is determined to meet waste acceptance criteria. A sample analyzed for the full TCLP suite is collected for every 5,000 tons of solid waste generated in accordance with the receiving facility's disposal criteria.

7.10 WASTE CHARACTERIZATION

Waste characterization is discussed in the Waste Management Plan included as Appendix C.

7.11 TRANSPORTATION AND DISPOSAL

In accordance with the waste management plan, the stabilized soils will be transported to Waste Management's El Coqui Landfill, Humacao, a RCRA Subtitle D permitted facility in Puerto Rico. The USA Team will load the materials in lined dump trucks that transport the materials to the landfill. The trucks will not enter contaminated areas and will be loaded adjacent to the staging area. Each load will be manifested as required by the Commonwealth of Puerto Rico PREQB regulations. The disposal manifest will be signed and returned documenting the disposal. Weight tickets from the landfill will be received for each truck load. Theses manifests will become an appendix to the final report. Prior to departing the site, all trucks will be inspected at an inspection station. The inspection will consist of checking for and removing any non-contaminated debris on the tires and the truck body that may come loose during transportation. These inspections will be conducted any time a truck leaves, including after rain events when muddy conditions could exist to prevent the spread of non-contaminated nuisance soils and foreign objects on public roadways.

7.12 CONFIRMATION SAMPLING

Confirmation samples will be collected from the excavated soil area by CH2M Hill under separate contract to NAVFAC SE. Confirmation samples will be collected in accordance with the Sampling and Analysis Plan (Attachment 1). The USA Team will coordinate with NAVFAC SE and CH2M Hill to expedite confirmation sampling to ensure that the excavation schedule is uninterrupted.

7.13 SITE CLEAN-UP AND DEMOBILIZATION

Upon completion of excavation at each site, intermediate restoration will be conducted as necessary prior to final restoration. Intermediate measures such as slope reduction and erosion control will be implemented to ensure safe working conditions. The intermediate restoration measures in a given area may be altered upon final grading and restoration, or may be maintained and incorporated into the final restoration plan.

7.13.1 BACKFILL AND COMPACTION

Backfill of each excavation area will be completed during the Final Remedy for SWMU 77 and is no longer part of the interim corrective measure.

7.13.2 GRADING

Each excavation area will remain open and each side wall will be sloped for safety. Grading will occur so that there will be no closed drainage areas that could allow surface water to pond. See each subarea's restoration sheets included in Appendix B for details.

7.13.3 POST CONSTRUCTION AS-BUILT SURVEY

The USA Team will utilize a Commonwealth of Puerto Rico-licensed surveyor to conduct a survey of the excavation areas upon completion of field work.

7.13.4 PLANTING AND RE-VEGETATION

Any clearing of vegetation outside of the excavation areas will be above ground only (roots will remain intact). When construction is complete, vegetation will be allowed to re-grow naturally. Vegetation will be replanted in the excavation areas by spreading native grass seed, applying mulch consisting of hay, and fertilizing, as necessary, to comply with Navy and PREQB requirements.

7.13.5 DEMOBILIZATION OF EQUIPMENT

After project tasks are complete, the USA Team will schedule a pre-final inspection to ensure the work has been completed to the plans and specifications and to the satisfaction of NAVFAC SE. A punch list of any remaining items will be developed to serve as a guideline for the USA Team to complete. At the final inspection, the USA Team will present a completed DD Form 1354, Transfer and Acceptance of Real Property, to NAPR or other appropriate organization for signature and acceptance.

Temporary contractor facilities will be removed and demobilized after site activities are complete and approved by NAVFAC personnel or other organization designated by NAVFAC. Construction debris and temporary facilities, barriers, etc., will be removed and the areas returned to as close to pre-mobilization condition as practicable.

At the conclusion of site work, the USA Team will demobilize equipment and personnel from the site. Demobilization activities will be coordinated with NAVFAC and facility personnel to ensure there is a smooth transition off site, with minimal disruption to daily operations.

Upon completion of site construction activities, the USA Team will provide applicable drawings and present them to the designated POC.

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8.0 ENVIRONMENTAL PROTECTION PLAN

The following sections outline details to ensure the fieldwork associated with the removal activities do not contribute to the release of potential contaminants into the environment or negatively impact sensitive habitats. In accordance with the BA, before any soil disturbance begins, the soil removal boundaries and all sensitive areas to be avoided and protected during the work will be clearly marked in the field and recorded in field notes. Also, all onsite personal will receive training as described in the BA. The maximum potential extent of soil and vegetation disturbance associated with this removal action within each subarea have been identified in the BA. No disturbance will be allowed outside of the maximum extents identified in the BA and no work will occur in mangrove wetlands or coastal marine habitats (CH2MHill, 2013a).

Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural, or historic perspective. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources. This includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; and other pollutants.

This EPP includes information on Emergency Planning and Community Right-to-Know Act (EPCRA) reporting requirements. Additionally, this plan describes protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during removal activities.

8.1 NATURAL RESOURCES

The USA Team understands its responsibility to preserve the natural resources within the project boundaries and adjoining areas. Because backfill of each subarea has been deferred to the final remedy, the USA Team will ensure all excavation side walls are sloped to ensure safety and natural resources outside of the work areas are protected upon completion of work.

8.1.1 LAND RESOURCES

Land surfaces outside the maximum potential extent of soil and vegetation disturbance areas identified in the BA will not be disturbed. Equipment lay-down or work pads will be as small as practical without jeopardizing worker safety or productivity. The ingress and egress to the Site will be flagged to ensure disturbance to natural resources is minimized.

8.1.2 TEMPORARY CONSTRUCTION

Any temporary fencing installed around work areas, and other signs of construction will be removed prior to demobilization. Any waste material generated by USA Team will be hauled offsite.

8.1.3 WILDLIFE RESOURCES

All project activities will be managed to minimize interference with, disturbance to, and damage of wildlife resources. The USA Team does not anticipate any significant impact to wildlife resources and will conduct fieldwork in accordance with the BA to ensure that field activities do not interfere with any wildlife or wildlife habitats. Any wildlife identified during the execution of the project will be pointed out to the RPM and documented in the Contractor Production Reports.

8.1.4 CULTURAL RESOURCES

Any known historical, archaeological, or cultural resources within the work areas will be designated by the Navy prior to the commencement of construction activities. The USA Team assumes that the presence of an archeologist onsite is not required since the Site has not been specified as an archeological zone. However, if such resources are discovered during field activities, the USA Team will immediately stop construction activities and report findings to the RPM. Historical, archaeological, and cultural resources

include, but are not limited to, human skeletal remains; artifacts; shells, bone, charcoal, or other deposits; rocks, paving, wall, other construction features; any indication of agricultural or other human activities; or other implements considered to be of archaeological significance. Any historical and archeological resources discovered will be protected in-place and work will cease until otherwise directed by the Navy.

8.1.4.1 Objectives

The objective associated with historical and archeological resources is to have zero instances where the work activities would negatively affect any artifacts that were within the work areas. The USA Team will diligently watch all active excavation areas and immediately report any findings to the RPM.

8.1.4.2 Methods

Excavation will be monitored during intrusive work for any material that looks suspect or any material encountered that was unanticipated. The USA Team will completely stop operations when items that are obviously significant are encountered (human remains, artifacts, etc.). These items will be set aside and reported immediately to the RPM for investigation. The USA Team does not anticipate encountering any historical and archeological resources during excavation.

8.2 MUNITIONS AND EXPLOSIVES OF CONCERN

If any suspected MEC items are discovered while work is being conducted at the site, the following precautions will be conducted, but are not limited to:

- Stop all work in the area and isolate area of concern
- Notify the Activity POC and RPM
- Secure the MEC item in accordance with the approved ESS. If the item is acceptable to move, it is relocated outside the excavation area and secured until final disposition can be arranged. If the item is not acceptable to move, the location will be recorded and excavation halted in the vicinity of the MEC item.
- Works resumes in the area only after proper disposal and/or removal of the MEC item.

8.3 STORM WATER MANAGEMENT AND CONTROL

Erosion and sediment control BMP (i.e., silt fence, dust control, etc.) will be implemented as necessary. The USA Team will construct and/or install temporary erosion and sediment control BMPs to divert stormwater from exposed areas and prevent migration of sediment and pollutants from moving outside the boundary limits at each SWMU 77 subarea.

During field activities, the QCM will continually inspect disturbed areas and sediment controls prior to any forecasted rain events expected to exceed 0.5 inches or greater within 24 hours. Also, the QCM will inspect disturbed areas and sediment controls within 24 hours after any rainfall of 0.5 inches or greater within a 24 hour period. These inspections at the site will ensure the controls are in place, are functioning, and are adequate. If sediment inspections indicate that a control is not functioning properly, the control will be replaced or modified promptly. Additionally, a monthly inspection as required by PREQB will be conducted by Right Way.

Site specific BMP methods that may be employed to stabilize against erosion include, covering with anchored netting, silt fencing or combinations of other methods necessary for effective erosion control. Other measures will be engineered appropriate to the site once work has commenced. Sediment fence and erosion control blankets will be used on any embankments as necessary and specified by the RPM. In areas that do not have significant slopes, erosion control fencing may be sufficient.

8.4 SPILL CONTROL PLAN

The USA Team will be responsible for any spills or leaks caused by its operations during the performance of this contract. The USA Team will provide contingency measures for potential onsite spills of any potentially hazardous or other regulated materials. The USA Team will provide the following:

- Identification of potential spill pathways and receptors
- Methods, means, and facilities to prevent contamination of soil, water, air, structures, equipment, or material from a release due to the USA Team's operations
- Equipment and personnel to perform emergency measures to mitigate spills and control their migration
- A decontamination program to minimize potential for contamination of adjacent areas.

The methods employed on this project to prevent and control spills will include lining soil stockpile areas with polyethylene sheeting; installing liners inside rolloff boxes; carefully loading soil into trucks to avoid spillage; and always using good work practices to avoid unnecessary spillage.

8.4.1 SPILL RESPONSE

The following requirements will be met for a spill of a hazardous material:

- Take immediate measures to control and contain the spill to prevent release into sewers or surface waters
- Notify the RPM immediately
- Notify Puerto Rice Fire Department immediately at 9-1-1
  - If the amount is above a reportable quantity or if any amount enters a waterway or storm sewer, the QCM will notify both The National Response Center Spill Reporting Hotline at 1-800-424-8802 and the Puerto Rico Environmental Quality Board at 787-767-8056 within 30 minutes of the spill. The USA Team will submit a spill and/or discharge report to the RPM within 2 days of a release. The report will be finalized between the USA Team and the Navy within 7 days of the spill, and the Navy will provide the report to the appropriate regulatory authorities. The report will include the following items:
  - Description of material spilled including identity, quantity, and a copy of the waste disposal manifest
  - Exact time and location of the spill, and a description of the area involved
  - Containment procedures used
  - Description of cleanup procedures used at the site including disposal of spill residue
  - Summary of CAPE communications with other agencies.
- Isolate and contain hazardous spill areas with absorbent pads, booms, and pillows
- Use spill kits to absorb liquids
- For larger spills, dispatch vacuum tanker and/or emergency response team
- Deny entry to unauthorized personnel
- Do not allow anyone to touch the spilled material
- Stay upwind and keep out of low areas
- Keep combustibles away from the spilled material
- Collect samples for analysis to determine that cleanup is adequate
- Take other appropriate actions, as needed.

The USA Team will have a representative available on-call 24 hours a day during this project to handle emergencies at the site. Refer to the SSHP for the Emergency Contact List. The USA Team has identified

Caribe Hydroblasting Inc. (CHED), an established local work force having OSHA 1910.120 training, as the contractor who will be used for emergency response. The USA Team will have spill kits, absorbent pads, and a decontamination pad on site for the duration of the project.

8.5 DUST CONTROL PLAN

Dust may be generated by construction activities during dry weather. If visible dust appears to be generated within the breathing zone of workers or capable of migrating beyond the construction limits at any of the sites, dust control measures will be implemented. The measures may include covering stockpiled soils or spraying water on the soils and worksite. If dust is still not adequately controlled, workers exposed to the dust may be required to upgrade their PPE from Level D to Level C (full-face respirator with the appropriate cartridge) in accordance with the SSHP. The particulate (dust) concentration and action levels will be determined and documented as described in the SSHP, and PPE upgrade will be performed if the particulate action level is exceeded. During the onsite soil stabilization process, to mitigate dust generation, the stabilizing agent bags will be unloaded directly onto the stockpile and the bags opened, **not** poured onto the stockpile. Before the stabilizing agents are mixed with the stockpiled soil, water will be added to the stockpile. As an additional precaution, workers will wear dust masks during the stabilization process.

8.6 CONTAMINANT PREVENTION PLAN

All activities will be performed in a manner to minimize risk for accidental release to the environment, minimize unsafe worker conditions, and minimize complications and delays to project completion. The USA Team will minimize the number of times contaminated sediments and soils are handled. Onsite handling of soils will occur during excavation, loading, and sampling activities. Soils that are stockpiled on site will be stored on top of a bermed polyethylene liner and covered with polyethylene to prevent contaminants from migrating off site or into clean soil below the pile.

Exclusion zones and will be established within the work areas by the SSHO. All heavy equipment, machinery, vehicles, instrumentation, and personnel will be decontaminated before exiting these zones in an effort to minimize migration of contaminants.

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9.0 REPORT REQUIREMENTS

9.1 CONSTRUCTION COMPLETION REPORT

At the completion of the project, the USA Team will submit draft and final Construction Completion Reports to NAVFAC which will document the work performed, quantities of lead abated, manifests, daily QC Logs, Activity Logs, Monitoring Logs, and Waste Manifest Tracking Logs. The final report will also include photographs which will document pre-abatement conditions, work progress, post-abatement conditions, and the Confirmatory Sampling Report. The Completion Report will include the following information related to the work performed at the site:

- Synopsis of site activities
- Deviations to the WP, including required changes in the sequencing of work, schedule changes, and field change orders that were approved by the Activity POC
- Site safety and health information, including daily safety logs, health and safety air monitoring, visitors to the site, and incident reports (if necessary)
- Tabular laboratory analytical results and laboratory data packages
- Decontamination activities
- Storage and disposal activities
- Shipping manifests and disposal documents for material removed from the site
- Documentation stating the range has been closed and has met clearance criteria for unrestricted use
- Scaled as-built drawings
- Closure of the NDPES General Permit (Notice of Termination [NOT]) and the Government of Puerto Rico General Permit (Fugitive Dust Permit, Erosion Control Permit, and DS3 Permit)

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10.0 REFERENCES

CH2M Hill. 2013a. *Biological Assessment for RCRA Corrective Action Interim Measures Site UXO 1 (SWMU 77) – Small Arms Range, Naval Activity Puerto Rico, Ceiba, Puerto Rico.* September.

CH2M Hill. 2013b. *Draft Uniform Federal Policy Sampling and Analysis Plan Site UXO 1 (SWMU 77) – Small Arms Range Confirmatory Soil Sampling in Support of RCRA Corrective Action Interim Measures, Naval Activity Puerto Rico, Ceiba Puerto Rico.* October.

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APPENDIX A. PROJECT SCHEDULE

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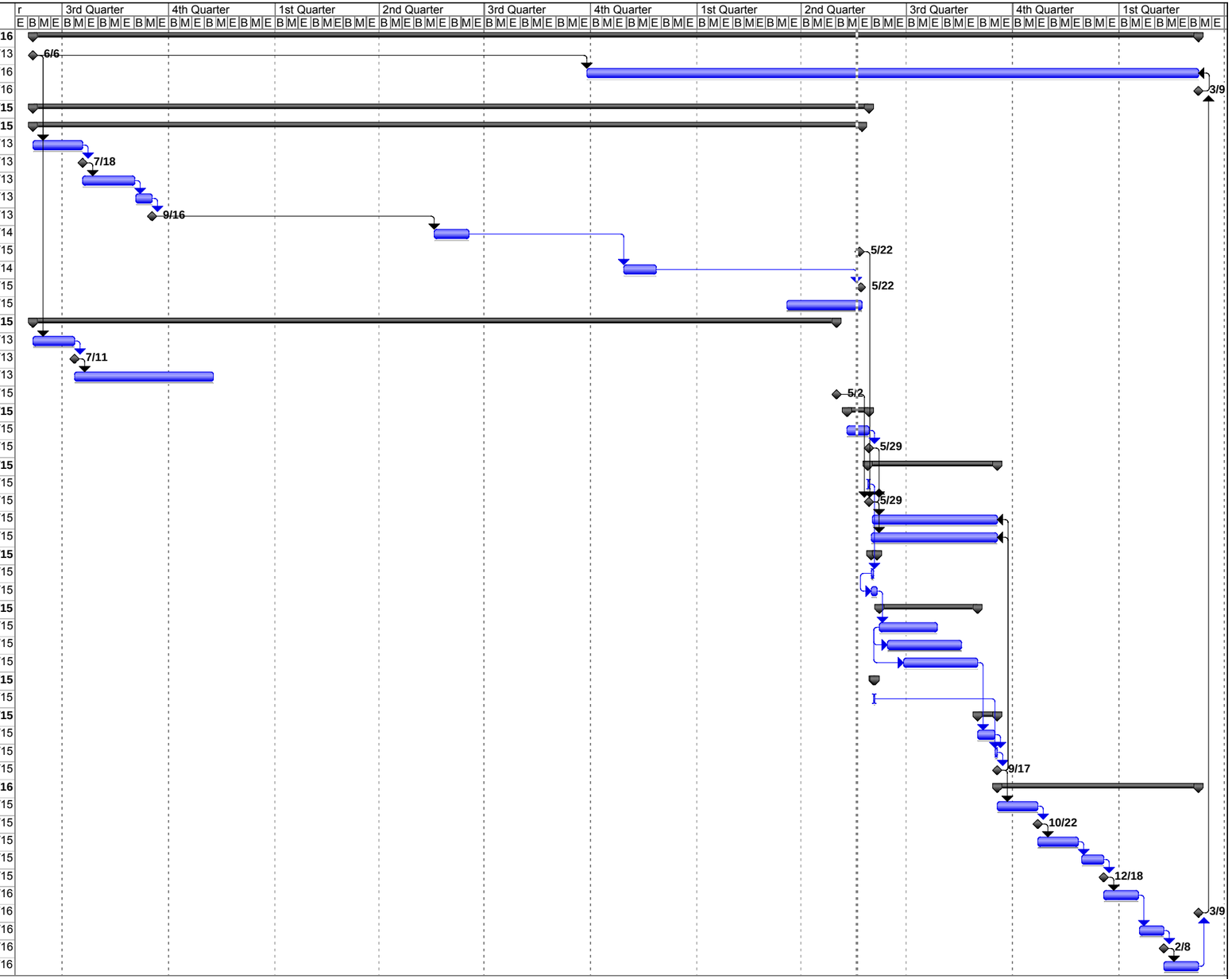
ID	Task Name	Duration	Start	Finish
1	**Project Management and Admin**	**1008 days**	**Thu 6/6/13**	**Wed 3/9/16**
2	NTP / Project Start	0 days	Thu 6/6/13	Thu 6/6/13
3	Project Management	529 days	Sun 9/28/14	Wed 3/9/16
4	Project Finish	0 days	Wed 3/9/16	Wed 3/9/16
5	**Work Plans**	**723 days**	**Thu 6/6/13**	**Fri 5/29/15**
6	**Corrective Measures Work Plan**	**717 days**	**Thu 6/6/13**	**Sat 5/23/15**
7	Prepare Draft	30 days	Thu 6/6/13	Thu 7/18/13
8	Submit Draft	0 days	Thu 7/18/13	Thu 7/18/13
9	Navy RPM Review of Draft	45 days	Fri 7/19/13	Sun 9/1/13
10	Address Comments and Prepare Draft Final	10 days	Tue 9/3/13	Mon 9/16/13
11	Submit Draft Final	0 days	Mon 9/16/13	Mon 9/16/13
12	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Draft Final	30 days	Mon 5/19/14	Tue 6/17/14
13	Navy RPM, BRAC PMO, USEPA, and PREQB Approval	0 days	Fri 5/22/15	Fri 5/22/15
14	Address Comments and Prepare Final	20 days	Thu 10/30/14	Wed 11/26/14
15	Submit Final	0 days	Fri 5/22/15	Fri 5/22/15
16	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Final	65 days	Fri 3/20/15	Sat 5/23/15
17	**Explosive Safety Plan**	**695 days**	**Thu 6/6/13**	**Sat 5/2/15**
18	Prepare Draft	25 days	Thu 6/6/13	Thu 7/11/13
19	Submit Draft	0 days	Thu 7/11/13	Thu 7/11/13
20	Navy RPM, BRAC PMO, and NOSSA Review of Draft	120 days	Fri 7/12/13	Fri 11/8/13
21	Navy RPM, BRAC PMO, and NOSSA Approval	0 days	Sat 5/2/15	Sat 5/2/15
22	**Site Permits**	**19 days**	**Mon 5/11/15**	**Fri 5/29/15**
23	Submission and Review of Permits	14 days	Mon 5/11/15	Fri 5/29/15
24	Approval of Permits	0 days	Fri 5/29/15	Fri 5/29/15
25	**Field Work**	**112 days**	**Fri 5/29/15**	**Thu 9/17/15**
26	Pre-Mobilization Kick-Off Meeting	1 day	Fri 5/29/15	Fri 5/29/15
27	Construction NTP / Start	0 days	Fri 5/29/15	Fri 5/29/15
28	Site Management (Calendar Days)	108 days	Tue 6/2/15	Thu 9/17/15
29	Site Management (Working Days)	77 days	Mon 6/1/15	Thu 9/17/15
30	**Mobilization**	**5 days**	**Mon 6/1/15**	**Fri 6/5/15**
31	Mobilization	2 days	Mon 6/1/15	Tue 6/2/15
32	Site Preparation	5 days	Mon 6/1/15	Fri 6/5/15
33	**Remediation**	**85 days**	**Mon 6/8/15**	**Mon 8/31/15**
34	Soil Removal	35 days	Mon 6/8/15	Mon 7/27/15
35	Soil Stabilization	45 days	Mon 6/15/15	Mon 8/17/15
36	Soil Disposal	45 days	Mon 6/29/15	Mon 8/31/15
37	**Survey**	**1 day**	**Wed 6/3/15**	**Wed 6/3/15**
38	Site Survey	1 day	Wed 6/3/15	Wed 6/3/15
39	**Site Cleanup/Demobilization**	**17 days**	**Tue 9/1/15**	**Thu 9/17/15**
40	Site Restoration	10 days	Tue 9/1/15	Tue 9/15/15
41	Demobilitation	2 days	Wed 9/16/15	Thu 9/17/15
42	Construction Finish	0 days	Thu 9/17/15	Thu 9/17/15
43	**Completion Report**	**174 days**	**Fri 9/18/15**	**Wed 3/9/16**
44	Prepare Draft	25 days	Fri 9/18/15	Thu 10/22/15
45	Submit Draft	0 days	Thu 10/22/15	Thu 10/22/15
46	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Draft	35 days	Fri 10/23/15	Thu 11/26/15
47	Address Comments and Prepare Draft Final	15 days	Mon 11/30/15	Fri 12/18/15
48	Submit Draft Final	0 days	Fri 12/18/15	Fri 12/18/15
49	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Draft Final	30 days	Sat 12/19/15	Sun 1/17/16
50	Navy RPM, BRAC PMO, USEPA, and PREQB Approval	0 days	Wed 3/9/16	Wed 3/9/16
51	Address Comments and Prepare Final	15 days	Tue 1/19/16	Mon 2/8/16
52	Submit Final	0 days	Mon 2/8/16	Mon 2/8/16
53	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Final	30 days	Tue 2/9/16	Wed 3/9/16



Project: UXO 1 (SWMU 77) Soil Remo
Date: Tue 5/19/15

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Page 1

APPENDIX B. DRAWINGS AND SPECIFICATIONS

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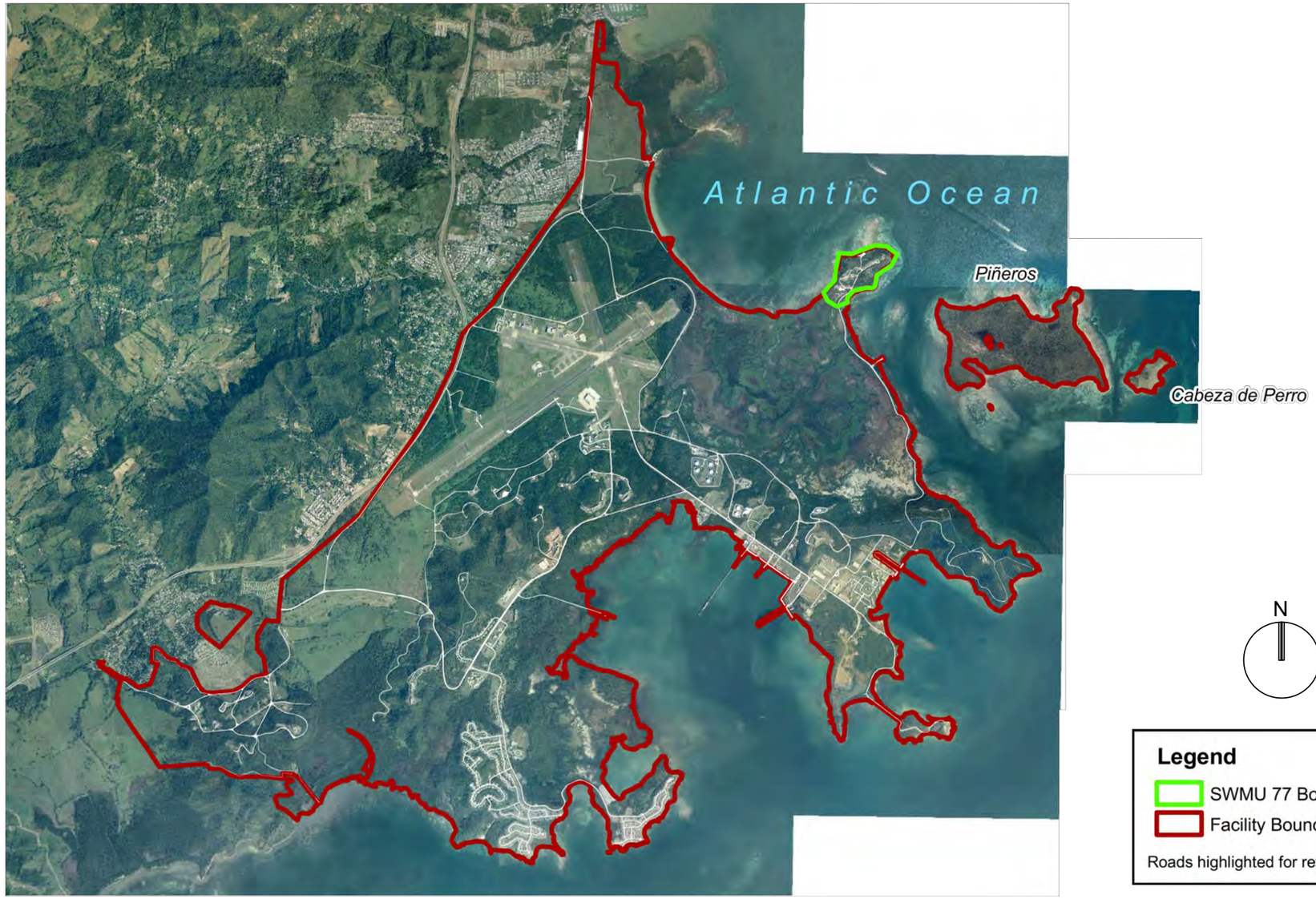

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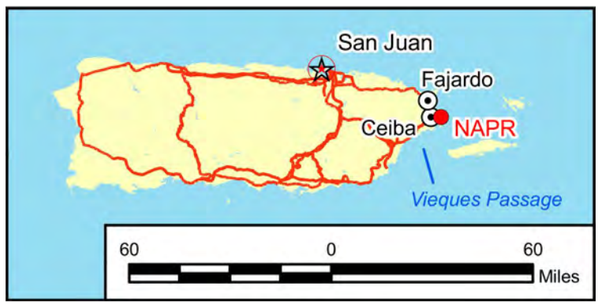
Legend

SWMU 77 Boundary

Facility Boundary

Roads highlighted for reference purposes.



SYM	DESCRIPTION	DATE	APPR

NAVFAC

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<CO>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SITE LOCATION MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 2-1 OF 2

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SWMU 77 Fig1.dwg LAYOUT NAME: 1 PLOTTED: Friday, June 28, 2013 - 5:33pm USER: crios

500 250 0 500 Feet

N

SYM	DESCRIPTION	DATE	APPR

NAVFAC

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<XX>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SWMU 77 SUBAREA MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 2-2 OF 2

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SWMU 77 Fig2.dwg LAYOUT NAME: 2 PLOTTED: Friday, June 28, 2013 - 5:46pm USER: crios

SYM	DESCRIPTION	DATE	APPR

NAVFAC

SEAL

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<CO>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)

NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

TRUCK ROUTE

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 7-1 OF 1

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SWMU 77 Fig1.dwg LAYOUT NAME: 1 PLOTTED: Friday, June 28, 2013 - 5:33pm USER: crios

VICINITY MAP

LEGEND

- Approximate Mangrove Lagoon Boundary
- Topographic Contour (elevation in meters)

Removal Area Boundary

- Actual
- Inferred
- Soil Removal to 1'
- Soil Removal to 3'
- Soil Removal to Grade (approx 10ft.)
- Subareas
- Site UXO-01 Boundary (SWMU 77)

Notes:
1. Imagery 2010 - ArcMap Streaming Map Service

N

0 100 200 400
Feet

FIGURE 7-2
Soil Removal Areas
Site UXO 1 (SWMU 77)
Naval Activity Puerto Rico
Ceiba, Puerto Rico

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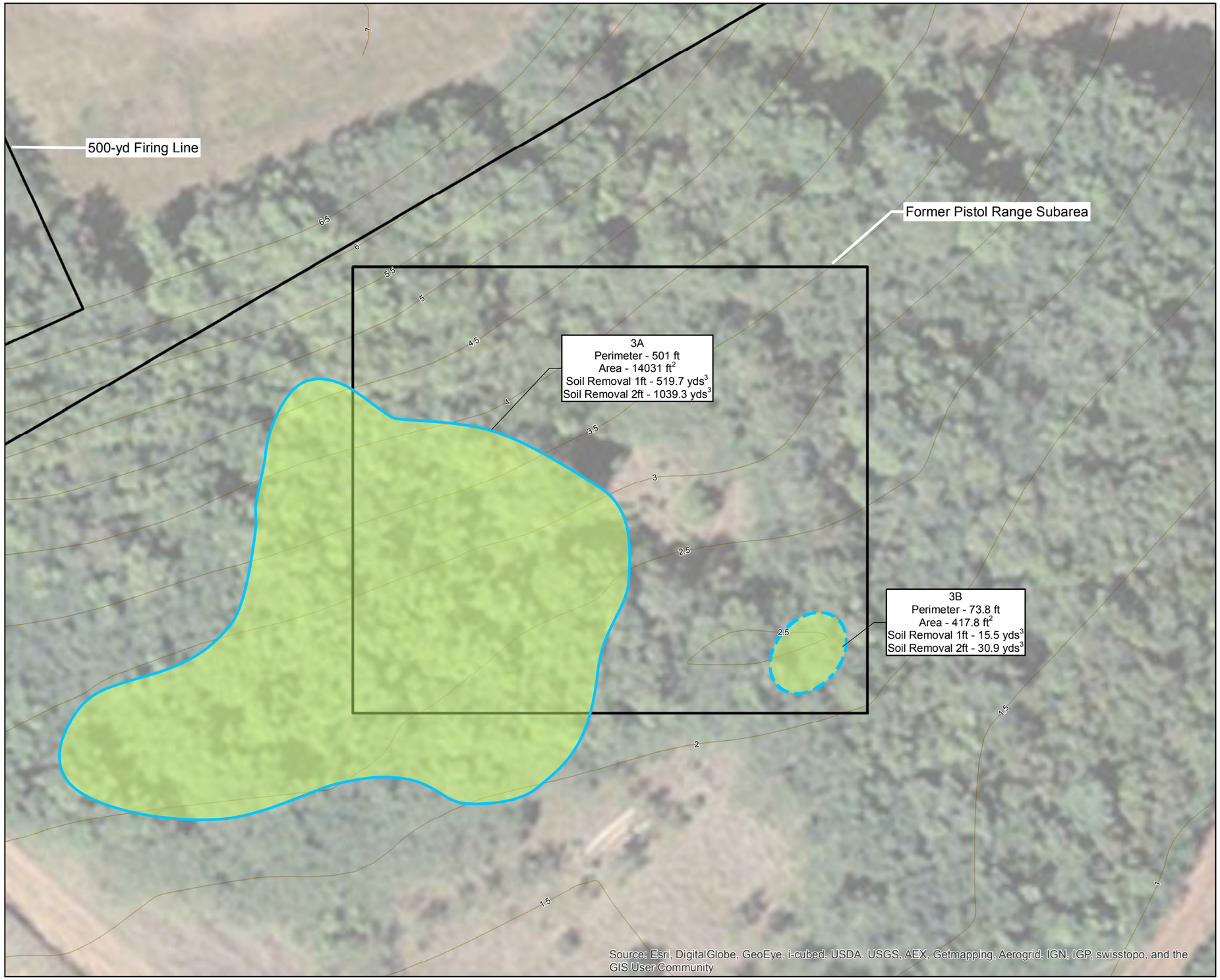

VICINITY MAP

LEGEND

Removal Area Boundary

- Actual
- Inferred
- Topographic Contour (elevation in meters)
- Soil Removal to 1'
- Subarea Boundary
- Site UXO 1 (SWMU 77) Boundary

Notes:
1. Imagery 2010 - ArcMap Streaming Map Service
2. Soil removal assumed to be 1 foot with the possibility of extending to 2 feet.

N

0 15 30 60
Feet

FIGURE 2-3
Former Pistol Range Subarea
Site UXO 1 (SWMU 77)
Naval Activity Puerto Rico
Ceiba, Puerto Rico

CH2MHILL

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VICINITY MAP

LEGEND

Removal Area Boundary

- Actual
- Inferred
- Topographic Contour (elevation in meters)
- Soil Removal to 1'
- Soil Removal to 3'
- Soil Removal to Grade (approx 10ft.)
- Subarea Boundary

Notes:
1. Imagery 2010 - ArcMap Streaming Map Service
2. Soil removal assumed to be 1 foot with the possibility of extending to 2 feet.

N

0 25 50 100
Feet

FIGURE 3-4
Rifle Range Subarea
Site UXO 1 (SWMU 77)
Naval Activity Puerto Rico
Ceiba, Puerto Rico

R:\USNAVYPUERTORICO20000317\MAPFILES\SWMU_77\INTERIMCORRECTIVEMEASURESCONSTRUCTIONPLANNING\FIGURE3_SWMU77_SOILREMOVAL_SUBAREA_RIFLERANGE.MXD JCARR 10/4/2013 4:14:23 PM

CH2MHILL

VICINITY MAP

LEGEND

Removal Area Boundary

- Actual
- Inferred
- Approximate mangrove lagoon boundary
- Topographic Contour (elevation in meters)
- Soil Removal to 1'
- Subarea Boundary
- Site UXO 1 (SWMU 77) Boundary

Notes:
1. Imagery 2010 - ArcMap Streaming Map Service
2. Soil removal assumed to be 1 foot with the possibility of extending to 2 feet.

N

0 15 30 60
Feet

FIGURE 4-5
Pistol Range Subarea
Site UXO 1 (SWMU 77)
Naval Activity Puerto Rico
Ceiba, Puerto Rico

CH2MHILL

R:\USNAVYPUERTORICO20000317\MAPFILES\SWMU_77\INTERIMCORRECTIVEMEASURESCONSTRUCTIONPLANNING\FIGURE4_SWMU77_SOILREMOVAL_SUBAREA_PISTOLRANGE.MXD JCARR 10/2/2013 5:06:30 PM

APPENDIX C. WASTE MANAGEMENT PLAN

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Final

Waste Management Plan for UXO 1 (SWMU 77) Soil Removal

NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PR

May 2015

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Contract Number N62470-12-D-7016, CTO JM01

Final

Waste Management Plan
UXO 1 (SWMU 77) Soil Removal
NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PR

May 2015

Prepared for:

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Prepared by:

USA Environmental, Inc.
Cape Environmental Management, Inc
Right Way Environmental Contractors, Inc.

Prepared under:

Contract Number N62470-12-D-7016, CTO JM01

Waste Management Plan

UXO 1 (SWMU 77) Soil Removal
Naval Activity Puerto Rico (NAPR), Ceiba, PR

May 2015

I hereby certify that the enclosed Waste Management Plan, shown and marked in this submittal, is that proposed to be incorporated with Contract Number N62470-12-D-7016, Contract Task Order JM01, *"Multiple Awards Indefinite Delivery Indefinite Quantity (IDIQ) Range Sustainment, Military Munitions Response; Environmental Compliance & Remediation Services Contracts Scope of Work for UXO 1 (SWMU 77) Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, PR."* This Waste Management Plan is in compliance with contract specifications, Occupational Safety and Health Administration requirements, United States Army Corps of Engineers, Safety and Health Requirements Manual (EM 385-1-1, 15 Sept 08), and is submitted for Government approval.

Reviewed By:

05/20/2015

Project Manager — Date

5/00/2015

Quality Control Manager — Date

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Table 2-2: Investigation-Derived Waste Liquid Sample Bottle Requirements

Appendices:

Appendix A: Puerto Rico Environmental Quality Board (PREQB) Form PGC-012

Appendix B: PREQB El Coqui Landfill Operation Permit (Permit Number IDF-36-0016)

Appendix C: PREQB Fraticelli Trucking Transportation Permit (Permit Number HW-27)

Appendix D: Waste Management EZ Profile

Appendix E: El Coqui Landfill Non-Hazardous Waste Transportation/Acceptance Document

Appendix F: SWMU 77 Disposal Log for Non-Hazardous Waste

Appendix G: Transportation Route

Appendix H: EPA Region 4 SESD Waste Sampling Operating Procedure

ACRONYMS AND ABBREVIATIONS

BRAC	Base Realignment and Closure
CFR	Code of Federal Regulations
CRZ	Contamination Reduction Zone
CTO	Contract Task Order
CY	Cubic Yards
DOT	Department of Transportation, United States
EM	Engineers Manual
EPA	Environmental Protection Agency, United States
HDPE	High Density Polyethylene
IDW	Investigation Derived Waste
NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PR	Puerto Rico
PREQB	Puerto Rico Environmental Quality Board
RCRA	Resource Conservation and Recovery Act
RPM	Remedial Project Manager
SESD	Science and Ecosystem Support Division
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
U.S.	United States
USACE	United States Army Corps of Engineers
USA	USA Environmental, Inc.
USA Team	USA Environmental, Inc. and subcontractors Cape Environmental Management Inc. and Rightway
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WMP	Waste Management Plan
WP	Work Plan

1. INTRODUCTION

This Waste Management Plan (WMP) has been prepared for the Naval Facilities Engineering Command Southeast (NAVFAC SE) under Contract Number N62470-12-D-7016, Contract Task Order (CTO) JM01. The purpose of this CTO is to perform soil removal at Naval Activity Puerto Rico (NAPR) UXO 1 (SWMU 77).

This project will be completed in accordance with applicable sections of the federal regulations, including Title 29 of the Code of Federal Regulations (CFR) describing Occupational Safety and Health Standards. Coordination with the applicable federal, state, and local agencies is necessary to ensure field activities comply with substantive requirements of any applicable permits.

1.1 SCOPE OF WORK

The interim corrective measure consists of soil removal. The scope of work includes the following:

- Pre-construction activities
- Mobilization and Site Preparation
- Site Surveys
- Temporary facility construction
- Temporary environmental controls
- Soil excavation
- On-site soil treatment
- Waste Transportation and disposal
- Site cleanup
- Demobilization

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2. WASTE MANAGEMENT PLAN

The purpose of this Waste Management Plan (WMP) is to detail how waste generated during the implementation of the Interim Corrective Measure remedial action at UXO 1 (SWMU 77) will be handled, documented, transported, and disposed of at the Waste Management of Puerto Rico El Coqui Landfill in Humacao, Puerto Rico. All waste generated from the remedial action will be characterized and classified in accordance with Title 40 *Code of Federal Regulations* (CFR) Part 261, Subpart C. All waste will be managed and disposed of in accordance with the requirements of the EPA, Puerto Rico Environmental Quality Board (PREQB), and NAPR.

2.1 CONSTRUCTION AND SITE MANAGEMENT WASTE TYPES

Waste types and quantities anticipated during the interim corrective measure include the following:

- Excavated Contaminated Soil – This waste will be transported from each of the 3 subareas to a centralized 'stabilization area' located at the Rifle Range Subarea. At the stabilization area, the soils will be stockpiled and mixed with a stabilization agent and will be sampled for the full TCLP suite until the soil meets the landfill acceptance criteria. The USA Team estimates there will be approximately 10,057 CY (11,565 tons) of in situ contaminated soil. This waste will be disposed of at the El Coqui Landfill.
- Final Decontamination Fluids – This waste will be containerized in Department of Transportation (DOT) 55-gallon closed head drums for characterization and later disposal.
- Contaminated Debris, including but not limited to, discarded materials used in decontamination, plastic sheeting, PPE – This waste will be packed into DOT open head drums and will be disposed of with contaminated soil.
- Uncontaminated Debris (trash) - Existing structure debris (treated timber, concrete) will be directly loaded into trucks and disposed of off-site at the El Coqui Landfill. The USA Team estimates there will approximately 60 CY of uncontaminated debris.

2.2 WASTE MINIMIZATION TECHNIQUES

Wastes will be minimized by implementing the following techniques:

- Site clearing – all vegetative waste generated during the site clearing phase will be chipped and used as ground cover. This eliminates disposal of vegetative wastes.
- Soil excavation – excavation extents and depths will be marked by a licensed Puerto Rico Surveyor to minimize the possibility of removing more soil than required. Also, the excavator bucket will have a welded steel plate in front to make clean cuts during excavation activities to minimize any possible cross contamination.
- Decontamination - decontamination water from the early phases of construction (before soil stabilization is complete) will be used as part of the soil mixture when additional moisture is needed in the stabilization agent mixing process.

2.3 APPLICABLE REGULATORY CRITERIA

PREQB requires Form PGC-012 to be completed for all wastes to be disposed of during this project. A blank copy of Form PGC-012 is included as Appendix A. Treated soils will be transported to Waste Management's El Coqui Landfill, Humacao, which is a RCRA Subtitle D permitted facility in Puerto Rico. The PREQB Permit Number for the El Coqui Landfill is IDF-36-0016 and a copy of the permit is included as Appendix B. Waste soil will be transported off-site using Fraticelli Trucking, which is permitted by PREQB under Permit number HW-27. Permit HW-27 is included as Appendix C.

2.4 WASTE CHARACTERIZATION

All solid waste generated during the course of construction, including contaminated media that will not be reused, must be characterized to determine whether it is hazardous or non hazardous. All waste will be sampled for characterization in accordance with the procedures in Section 2.4.1.

Uncontaminated waste, that is, waste not in contact with contaminated media, such as general trash, will be characterized using process knowledge and generally will be classified as domestic solid waste. Contaminated debris, such as liners and PPE, will be disposed of with the contaminated soil.

Waste characterization information will be documented in a waste profile form provided by Waste Management (EZ Profile Form included in Appendix D) as part of the waste acceptance process. The waste profile form will be completed by the USA Team and submitted to NAPR for concurrence. Along with the profile information, the USA Team will submit PREQB Form PGC-012. Once the USA Team receives concurrence, the profile will be submitted to the disposal facility for approval. An approved copy of the waste profile will be received from the disposal facility prior to off-site transportation of the material. A NAPR representative will provide the generator signature for waste profiles.

A designated facility-approved copy of the waste profile will be received prior to scheduling off-site transportation of the waste.

2.4.1 Waste Characterization Sampling

This section describes the sampling protocols for waste characterization. Waste characterization sampling should be conducted in accordance with the EPA Region 4 Science and Ecosystem Support Division (SESD) *Operating Procedure for Waste Sampling Number SESDPROC-302-R2*, revised January 2013 (Appendix H).

2.4.1.1 SOIL/SOLIDS CHARACTERIZATION

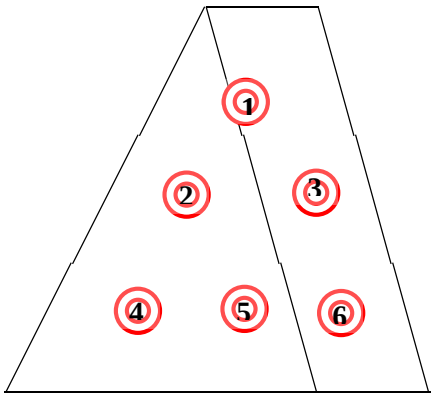
Waste characterization samples will be collected to evaluate the disposal requirements for soil accumulated during the soil removal activities. Soil samples will be collected and analyzed for the parameters listed in Table 2-1.

PROCEDURE FOR STOCKPILE SAMPLING

One composite sample and one grab sample will be collected per 5,000 tons (approximately 3,700 CY) of soil in accordance with the disposal facility's requirements. The composite sample will be analyzed for the full TCLP suite, except TCLP VOCs, and the grab sample will be analyzed for TCLP VOCs only.

A 3,700 CY section is illustrated below. Grab samples will be collected samples will be collected in equal volumes from the surface of the soil pile (Point 1), half depth (Points 2 and 3), and bottom (Points 4 through 6)

Grab samples from the six locations should be combined and mixed for a total of one composite sample for analysis. Note: TCLP VOC samples will be collected only from the half depth (Points 2 or 3) as grabs. TCLP VOC samples will not be composited.



Piles – Sectional Aliquot Locations

2.4.1.2 *LIQUIDS CHARACTERIZATION*

Waste characterization samples will be collected to evaluate the disposal requirements for liquids accumulated during decontamination activities. Liquid samples will be collected and analyzed for the parameters listed in Table 2-2.

PROCEDURE FOR SAMPLING LIQUIDS IN DRUMS

One composite sample and one grab sample for VOC analysis will be collected per 10 drums:

Collecting Volatile Samples

1. Using a bailer or dip jar, collect a grab sample from the drum
2. Fill the pre-preserved volatile organic analysis vials with the grab sample. The vials should be filled so there is no headspace in each vial.

Collecting Non-Volatile Samples

3. Using a bailer or dip jar, collect composite samples from five randomly selected drums
4. Fill the bottles with the composite water sample.

2.5 ON-SITE WASTE MANAGEMENT

Waste accumulation areas will contain emergency and spill response equipment appropriate to the hazards posed by the waste. **The Project SSHP identifies the project emergency response procedures and equipment, including emergency response contacts and phone numbers.**

2.5.1 Excavated Contaminated Soil

Excavated contaminated soil removed at each subarea will be transported to the stabilization area using 24 CY off road trucks. However, soils removed from the Pistol Range Subarea may be staged next to the removal area in a temporary laydown area. If a temporary laydown area is used, the area will be prepared by constructing a berm and placing 30 mil poly sheeting on the ground. Additionally, the stockpiled soils will be covered with 6 mil poly sheeting if rain is forecasted. The soil stabilization area will be located at the Rifle Range Subarea and will be a 50 foot by 90 foot area. The stabilization area will be constructed using small pit gravel layer and a 30 mil HPDE liner. Berms will be constructed around the edges of the stabilization area. As the contaminated soil is relocated to the stabilization area, care will be taken to prevent

soil from falling outside the truck dumpster. Also, when the truck is emptied at the stabilization area, ground personnel will check the truck gate to ensure it is closed and that there is no soil on the tailgate that could fall during transit. In the event any soil or debris falls on the roads during transportation, the USA Team will mobilize equipment and personnel to clean up contaminated soil. Stockpiled soil will be covered with 6-mil HDPE liners to ensure soil will not be spread by wind.

Equipment working within the stabilization area will remain inside the stabilization area at all times to prevent migration of contaminants into adjacent areas. Once soil stabilization is completed and all stockpiled soil has been transported off-site for disposal, the equipment will be decontaminated before leaving the stabilization area.

A stabilization agent will applied to the stockpiled soil in the stabilization area and once the agent fully reacts with the soil (Typically 8 to 24 hours), samples following the sample procedures discussed in Section 2.4.1.1 will be collected to determine if the stabilized soil meets the landfill waste acceptance criteria. The stabilization agent may be reapplied, as necessary, until soil sample results meet the landfill waste acceptance criteria.

2.5.2 Decontamination Fluids

A decontamination facility will be constructed at the small arms range for personnel and equipment decontamination. The USA Team will construct an equipment decontamination pad with one layer of 30 mil HDPE and crushed stone. A berm with sandbags will be constructed on all sides of the decontamination pad. Equipment used within the contaminated areas will be decontaminated using dry methods (shovels and brushes). Before any equipment is demobilized from the site it will be placed on the decontamination pad and power washed. Water collected from the decontamination facility will be collected, sampled and characterized as described in Section 2.4.1.2.

2.5.3 Contaminated Debris

Contaminated debris includes but is not limited to discarded materials used in decontamination, plastic sheeting, and PPE. Contaminated debris will be disposed of with the waste soil at the El Coqui Landfill. PPE and discarded items will be placed in drums. Plastic sheeting and empty supersacks will be mixed with the stabilized contaminated soil.

2.5.4 Uncontaminated Debris

Uncontaminated debris may include existing structure debris (treated timber, concrete), cleared vegetation, and domestic waste. Existing structure debris will be directly loaded into trucks and disposed of off-site at the El Coqui Landfill. Cleared vegetation will be chipped and used on-site as ground cover. Any site trash generated by site activities will be collected by the USA Team and disposed of off-site. Measures will be taken to control the generation of excess waste. Smaller trash bins/barrels will be set up in the support areas for domestic rubbish. Burning of solid waste will not be allowed. Upon completion of the project, the entire site and adjacent work areas will be patrolled for any debris, trash, or litter and such items will be removed.

2.5.5 Unanticipated Wastes

If unanticipated and potentially hazardous material is encountered, the USA Team will assess the unidentified material and following discussions with the RPM, will determine the appropriate analytical methods for identification of hazardous compounds. The USA Team will then obtain samples of the material for analysis. If the material is identified as a hazardous waste based on the analytical results, the appropriate treatment and/or disposal will be determined. Sampling, analysis, handling, transportation, and disposal of the hazardous material(s) will be completed in accordance with the approved SSHP, and all pertinent Federal and local regulatory requirements.

2.5.6 Inspection of Waste Accumulation Areas

Waste stockpiles and containers will be inspected at least weekly for malfunctions, deterioration, signs of corrosion, discharges, and leaks that could result in a release. Secondary containment will also be inspected at least weekly for liner and berm integrity and for signs of erosion.

Any deficiencies observed or noted during the inspection will be corrected immediately. Appropriate measures may include the transfer of waste from a leaking container to a new container, replacement of a liner or cover, or repair of a containment berm.

Inspections will be recorded. Each deficiency and the method to correct it will be documented. Copies of the report will be maintained on-site and available for review.

2.6 WASTE TRANSPORTATION AND DISPOSAL

2.6.1 Transporter Requirements

A transporter licensed for commercial transportation will transport non-hazardous waste. Each transportation vehicle and load of non-hazardous waste will be inspected before leaving the contractor laydown area and the inspection documented on a truck inspection checklist. The quantities of waste leaving the site will be recorded on a transportation and disposal log included as Appendix F. The PREQB permit for Fraticelli Trucking is included in Appendix C.

The Site Manager will complete a Waste Disposal Log (Appendix F). The Site Manager will also be responsible for calculating the soil that each truck can transport to ensure the truck will not surpass the 72,000 pound limit on the bridge that leads to the site. A transportation route is included as Appendix G.

The transporter will observe the following practices when hauling and transporting waste:

- Minimize impacts to general public traffic
- Repair road damage caused by construction and/or hauling traffic
- Clean up waste spilled in transit
- Line and cover containers used for hauling contaminated waste to prevent releases and contamination.

All personnel involved in transportation activities will follow safety and spill response procedures outlined in the SSHP.

2.6.2 Waste Disposal

Once the waste profile for the excavated soil is approved, the treated soils will be loaded into lined dump trucks and will transported to Waste Management's El Coqui Landfill, Humacao, a RCRA Subtitle D permitted facility in Puerto Rico. Each load will be manifested using the PREQB Form PGC-012 (Appendix A). The disposal manifest will be signed and returned documenting the disposal. Weight tickets from the landfill (Appendix E) will be received for each truck load. Theses manifests will be included in the Closure Report.

2.6.3 Shipping Documentation

Each load of waste material will be manifested prior to leaving the site. The generator (NAPR) and the transporter must sign the manifest prior to the load of waste leaving the site. The original facility-signed manifest will be returned to the address of the generator.

2.7 TRAINING

Field staff that will manage IDW from SWMU 77 will meet the following training requirements:

- Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response training
    - SSHP review; requires each site worker and guests to review and sign the SSHP
    - Activity hazard analysis and daily safety briefings
- Hazardous waste generator training requirements of 40 CFR 262.34 and 265.16
    - Documented annual training provided by qualified instructor
    - Project-specific Waste Management Plan review
- DOT training per 49 CFR Part 172, Subpart H, as appropriate for those performing the following functions:
    - Selecting and marking packaging or container for hauling
    - Preparing hazardous materials for transportation
    - Loading, unloading, or handling hazardous materials
    - Operating a vehicle used to transport hazardous materials.

Training certificates demonstrating compliance with the requirements presented herein will be provided to the Project Compliance Lead for each individual working on invasive fieldwork, prior to commencing the fieldwork.

2.8 RECORD KEEPING

The following records and documents will be provided to the RPM for filing:

- Copies of the waste profiles and associated characterization data
- Transportation and off-site disposal records, including the following:
    - - Transporter-signed manifest copy as well as the fully executed manifests and copies of the land disposal restriction notifications/certifications

- o - Designated off-site facility waste receipts, certificates of disposal/ destruction

- Training records
- Inspection records
- Disposal logs.

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3. REFERENCES

CAPE, Inc. (CAPE). 2013. *Draft RCRA Interim Corrective Measure Work Plan UXO 1 (SWMU 77) Soil Removal Naval Activity Puerto Rico (NAPR), Ceiba, PR,* July.

CAPE. 2013b. *Draft Site Safety and Health Plan RCRA Interim Corrective Measure UXO 1, (SWMU 77) Soil Removal Naval Activity Puerto Rico (NAPR), Ceiba, PR,* July.

Department of the Navy, Naval Facilities Engineering Command, Atlantic, 2013. *Statement of Work Multiple Awards Indefinite Delivery Indefinite Quantity (IDIQ) Range Sustainment, Military Munitions Response; Environmental Compliance and Remediation Services Contracts Scope of Work for UXO 1 (SWMU 77) Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, PR.* January.

United States Army Corps of Engineers (USACE). 2008. *Safety and Health Requirements Manual. EM-385-1-1.* September.

United States (US) Department of Labor, Occupational Safety and Health Administration. *Title 29, Code of Federal Regulations, Part 1910 and 1926*. 2010.

US Environmental Protection Agency (USEPA) Region 4 Science and Ecosystem Support Division (SESD). 2013. *Waste Sampling Operating Procedure Number: SESDPROC-302-R2.* January.

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TABLES

Table 2-1
Investigation-Derived Waste Soil Sample Bottle Requirements

Parameter	Analytical Method	Bottle Requirement	Preservative
TCLP VOCs	SW1311/8260B	(1) 25-gram Encore sampler	Ice
TCLP SVOCs	SW1311/8270D	(1) 8-oz glass jar	Ice
TCLP Pesticides	SW1311/8081A	(1) 8-oz glass jar	Ice
TCLP Herbicides	SW1311/8151A	(1) 8-oz glass jar	Ice
TCLP Metals	SW1311/6010C/7470A	(1) 8-oz glass jar	Ice
PCBs	SW8082A	(1) 8-oz glass jar	Ice
Ignitability	SW1010A	(1) 8-oz glass jar	None
Corrosivity	SW9045C	(1) 8-oz glass jar	None
Reactivity	SW846 Chapter 7	(1) 8-oz glass jar	None

Notes:
oz ounce
PCB polychlorinated biphenyl
SVOC semivolatile organic compound
TCLP toxicity characteristic leaching procedure
VOC volatile organic compound

The most current version of each analytical method will be used during the implementation of the Interim Corrective Measures and associated waste disposal.

Table 2-2
Investigation-Derived Waste Liquid Sample Bottle Requirements

Parameter	Analytical Method	Bottle Requirement	Preservative
VOCs	SW8260B	(3) 40-milliliter glass vials	HCl to pH < 2, Ice No bubbles/ headspace
SVOCs	SW8270D	(1) 1-liter amber glass	Ice
Pesticides	SW8081A	(1) 1-liter amber glass	Ice
Herbicides	SW8151A	(1) 1-liter amber glass	Ice
Eight RCRA Metals	SW6010C/7170A	(1) 500-milliliter HDPE	HNO_3 to pH<2, Ice
PCBs	SW8082A	(1) 1-liter amber glass	Ice
Ignitability	SW1010A/1020B	(1) 1-liter amber glass	Ice
Corrosivity	SW9040C	(1) 1-liter amber glass	Ice
Reactivity	SW846 Chapter 7	(1) 1-liter amber glass	Ice

Notes:
HCl hydrochloric acid
HDPE high-density polyethylene
HNO_3 nitric acid
PCB polychlorinated biphenyl
RCRA Resource Conservation and Recovery Act
SVOC semivolatile organic compound
VOC volatile organic compound

The most current version of each analytical method will be used during the implementation of the Interim Corrective Measures and associated waste disposal.

APPENDIX A

PREQB Form PGC-012

GOBIERNO DE PUERTO RICO
OFICINA DEL GOBERNADOR
JUNTA DE CALIDAD AMBIENTAL

Área de Calidad de Agua

OGPe
Oficina de Gerencia de Permisos

Forma PGC-012

MANIFIESTO PARA UNA ACTIVIDAD GENERADORA

GENERADOR

1. Proyecto:	**2. Localización Física:**
3. Dueño, Representante Autorizado u Operador: **4. Teléfono:**	**5. Dirección Postal:**
6. Número de Permiso General: **7. Fecha de Expiración:**	**8. Tipo de Desperdicios:** **9: Cantidad en yds³ :**
10. Transportador: **11. Número de Permiso:**	**12. Fecha de Expiración:** **13. Número de Tablilla:**

Certificación de Entrega: Declaro bajo pena de perjurio que la información suministrada ha sido examinada, y la misma, a mi mejor entendimiento, es verdadera, precisa y completa.

Firma Original
Dueño, Representante Autorizado u Operador

Fecha

DISPOSICION

14. Instalación de Disposición Final:	**15. Permiso JCA:** **16. Teléfono:**
17. Localización Física:	**18. Dirección Postal:**
19. Recibido por:	**20. Puesto que Ocupa:**

Certificación de Recibo: Declaro bajo pena de perjurio que la información suministrada ha sido examinada, y la misma, a mi mejor entendimiento, es verdadera, precisa y completa.

Firma

Fecha

INSTRUCCIONES

Este documento debe acompañar cada cargamento de desperdicios producidos durante la actividad generadora hasta su disposición final, según lo dispone la Regla 644, Inciso D (7) del Reglamento para el Manejo de los Desperdicios Sólidos No Peligrosos de la JCA.

1. El **Generador** origina el manifiesto, completando **todos** los encasillados correspondientes, firmará certificando que la información es correcta y entregará el manifiesto con la carga al Transportador.

2. El **Transportador** llevará la carga hasta la instalación de disposición final, donde entregará el manifiesto y la carga.

3. El encargado de la **Instalación de Disposición Final** recibe la carga, completa los encasillados correspondientes, firmará certificando haber recibido el cargamento y devolverá el manifiesto al Transportador.

4. El **Transportador** devolverá al Generador el manifiesto firmado como evidencia de haber depositado la carga.

5. El **Generador** mantendrá en el proyecto un registro de **todos** los manifiestos generados durante el desarrollo de la obra. **Al culminar el proyecto se entregará el original de este registro a la JCA para cerrar el expediente del caso.**

Original--JCA
Copia--Generador

Para cualquier duda sobre este documento, puede comunicarse con cualesquiera de las oficinas de la JCA:

Humacao	Ponce	Arecibo	Mayagüez	Guayama
285-2818	840-4070	880-0013	833-1188	864-0103

Área Metro
767-8181

Dirección Física: Ave. Ponce de León 1308, Carr. Estatal 8838, Sector el Cinco, Río Piedras, PR 00926
Dirección Postal: Apartado 11488, Santurce, PR 00910-1488
Tel. (787)-767-8181 • Fax (787)-767-8118

PUERTO RICO VERDE

APPENDIX B

El Coqui Landfill Permit

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Oficina del Gobernador
Junta de Calidad Ambiental

Área Control Contaminación de Terrenos

PERMISO DE OPERACIÓN

Esta Junta autoriza al **Sr. René R. Rodríguez,** representante autorizado de la actividad, a continuar operando una Instalación de Disposición Final de Desperdicios Sólidos No Peligrosos por un período de cinco (5) años. La fecha de vigencia expirará **8 de enero de 2014.**

Este permiso está condicionado a que la persona autorizada demuestre a satisfacción de esta Junta, que la operación de la instalación está y podrá permanecer en cumplimiento con todos los reglamentos aplicables y con el Plan de Operación aprobado por esta Junta. El otorgamiento de este permiso conlleva la aceptación de todas las condiciones de permiso presentadas en el anejo que acompaña a este documento.

La Junta de Calidad Ambiental podrá suspender o revocar este permiso si se comprueba que se ha incurrido en alguna violación de las reglas o reglamentos vigentes, incluyendo las condiciones antes señaladas.

Número de Permiso	:	**IDF-36-0016 (Renovación)**
Nombre de la Instalación	:	**Instalación de Disposición Final de Desperdicios Sólidos No Peligrosos (El Coquí Landfill Corp.)**
Dirección Física	:	**Carr. Estatal 923, Km. 2.5, Bo. Buena Vista, Humacao, PR.**
Dirección Postal	:	**Apartado Postal 594, Caguas, PR 00726-0594**

Ing. Wanda García
Miembro Alterno

Ing. Ángel O. Berríos Silvestre
Miembro Asociado

Lcdo. Pedro Nieves Miranda
Presidente

Dirección Física: Edificio Agencias Ambientales Cruz A. Matos,
Urb. San José Industrial Park, 1375 Avenida Ponce de León, San Juan, PR 00926-2604
Dirección Postal: Apartado 11488, San Juan, PR 00926-2604
Tel. 787-767-8181 Fax 787-767-0119

APPENDIX C

Fraticelli Trucking Permit

13 de junio de 2011

RECEIVED
JUN 24 2011
Fraticelli Trucking Co. Inc.

Sr. Eduardo Fraticelli Alvarado
Gerente General
Fraticelli Trucking Co., Inc.
Firm Delivery 529, Carretera 385
Peñuelas, Puerto Rico 00624-7507

RE: NOTIFICACIÓN DE PERMISO FINAL - RENOVACIÓN DEL PERMISO PARA OPERAR UN SERVICIO DE TRANSPORTACIÓN DE DESPERDICIOS PELIGROSOS. FRATICELLI TRUCKING CO., INC., PEÑUELAS, PUERTO RICO - PERMISO NÚM. HW-27

Estimado señor Fraticelli:

Hacemos referencia a su solicitud de renovación del permiso para operar un servicio de transportación de desperdicios peligrosos para la compañía en referencia.

Queremos informarle que habiendo cumplido con las disposiciones del Reglamento para el Control de los Desperdicios Sólidos Peligrosos (RCDSP), edición compilada de 1998, mediante la radicación de la solicitud junto con los documentos requeridos para la renovación de su permiso, la publicación del Aviso correspondiente, el periodo de participación pública y dado que no se recibieron comentarios al respecto, esta Junta ha determinado otorgarle a la compañía **Fraticelli Trucking Co., Inc.**, la Renovación de su Permiso para Operar un Servicio de Transportación de Desperdicios Peligrosos.

Además, queremos informarle que deberá cumplir con lo siguiente:

1. Este permiso es intransferible, en cuyo caso de desear transferir el mismo deberá cumplir con las disposiciones de la Regla I-912.L del RCDSP.

2. Realizar los trámites necesarios con nuestra oficina para solicitar renovación de este permiso sesenta (60) días antes de la fecha de su vencimiento, a tenor con la Regla I-905.F del RCDSP.

3. Todos los camiones deberán rotularse a ambos lados con la frase: "Transporte Autorizado para Desperdicios Peligrosos, Permiso HW-27". Regla 706.B del RCDSP.

4. Copia del Plan de Emergencia o Contingencia y el equipo de seguridad, deberán mantenerse en cada uno de los camiones, para ser usado por los conductores en caso

Edificio Agencias Ambientales Cruz A. Matos, Urb. San José Industrial Park, 1375 Avenida Ponce de León, San Juan, PR 00926-2604
Dirección Postal: Apartado 11488, San Juan, PR 00926-2604 • Tel. 787-767-8181 • Fax 787-767-8118

de que ocurra una emergencia durante la transportación de desperdicios peligrosos. Reglas 207 y 707 del RCDSP.

5. La compañía será responsable de cumplir con los requerimientos establecidos en las Reglas 207, 302, 502.B, 503.A, 504.C, 505, 703, 706, 707, I-905, I-907 y I-908 del RCDSP y con la Parte 263 del Título 40 del Código de Reglamentos Federales (40 CFR, por sus siglas en inglés), relacionada con la Ley Federal de Conservación y Recuperación de Recursos (RCRA, por sus siglas en inglés).

Adjunto le incluimos el Permiso Final para continuar operando su servicio de transportación de desperdicios peligrosos, cuya fecha de expiración es **el 13 de junio de 2014.**

En caso de tener alguna pregunta, puede comunicarse con la Sra. Frances M. Segarra Román, de la División de Permisos de Desperdicios Peligrosos al teléfono (787) 767-8181, extensión 3581, o puede escribirle a su correo electrónico francessegarra@jca.pr.gov, a su mejor conveniencia.

Cordialmente,

María V. Rodríguez

María V. Rodríguez Muñoz, Gerente
Área Control Contaminación de Terrenos

Anejo: Permiso Final

PERMISO PARA OPERAR UN SERVICIO DE RECOLECCIÓN O TRANSPORTACIÓN DE DESPERDICIOS NO PELIGROSOS

SECCIÓN I – INFORMACIÓN GENERAL

Nombre de la Empresa	:	Fraticelly Trucking Co., Inc.
Número de Permiso	:	SR-0025
Dirección Física	:	Carretera PR-385 Km. 2.9 Bo. Tallaboa Peñuelas, Puerto Rico
Dirección Postal	:	Firm Delivery 529 Peñuelas P.R. 00624
Nombre del Dueño	:	Sr. Eduardo Fraticelli Alvarado
Número de Teléfono	:	787-836-1610

SECCIÓN II – TIPO DE DESPERDICIOS AUTORIZADOS EN EL PERMISO PARA LA RECOLECCIÓN Y TRANSPORTACIÓN Y LUGAR DE DISPOSICIÓN FINAL.

Los residuos autorizados a recolectar o transportar son: basura doméstica y/o industrial, material con contenido de asbesto, medicinas decomisadas, tierra de estabilización, líquidos de procesos no peligrosos, aguas sanitarias, material reciclable, desperdicios biomédicos regulados, aceite usado y neumáticos usados, los cuales serán acarreados hasta las siguientes instalaciones: los sistemas de relleno sanitarios de Ponce (Allied Waste Services) Humacao, Mayagüez y Peñuelas (Waste Management), las Plantas de Tratamiento de la Autoridad de Acueductos y Alcantarillados (Aguadilla, Barceloneta, Caguas, Ponce, Puerto Nuevo y Mayagüez), el material reciclable hasta Reciclaje del Norte en Hatillo, el material biomédico hasta Stericycle Inc. en Carolina, el aceite usado hasta Oil Energy System Inc. en Mayagüez y los neumáticos desechados hasta Crist & John Recyclers, Inc. en Aguada.

SECCIÓN III – DESCRIPCIÓN DE LOS VEHÍCULOS AUTORIZADOS EN EL PERMISO.

Remolques

MODELO	AÑO	NÚMERO DE TABLILLA
INTERNATIONAL	1999	HP-12577
MACK	2007	RP-10819
MACK	2007	RP-4846
MACK	2007	RP-7289
MACK	2007	RP-11601
MACK	2007	RP-11604
MACK	2007	RP-8893
MACK	1991	RP-11640
MACK	1992	RP-4841
MACK	1995	RP-11158
MACK	1995	RP-11168
MACK	1996	RP-11152
MACK	1996	RP-4839
MACK	1996	RP-11151
MACK	1997	RP-3662
MACK	1997	RP-4772
MACK	1999	RP-6285
MACK	2000	RP-6859
MACK	2000	RP-6861
MACK	2000	RP-7274
MACK	2000	RP-7275
MACK	2000	RP-7287
MACK	2004	RP-4808
MACK	2004	RP-4781
MACK	2005	RP-9664
MACK	2000	RP-6103
MACK	2000	RP-6091
MACK	2006	RP-10362
MACK	2006	RP-10361
MACK	2005	RP-9954

Página 3
Condiciones
SR-0025-RP

Tanques

MODELO	AÑO	NÚMERO DE TABLILLA
FRUEHAUF	1987	47459A
BREN TL	1990	109581A
ARROW	1981	72519A
POLAR	1992	72557A
FRUEHAUF	1965	43103A
HEIL	1973	26715A
TRAILEX	1964	83021A
CUSTOM TRLRS	1977	54702A
BUTLER	1979	54703A
FRUEHAUF	1979	24459A
FRUEHAUF	1970	83017A
ARROW	1975	25087A
FRUEHAUF	1973	88283A
FRUEHAUF	1973	115750A
FRUEHAUF	1970	40288A
BUTLER	1974	72537A
BUTLER	1974	72538A
BUTLER	1974	72531A
BUILT-RITE	1974	104524A
ARROW	1977	18705A
BAR-BEL	1986	102138A
WALK TL	2010	115742A
POLAR	1991	A08464
WALK TL	2010	115803A
POLAR	1991	104531A
POLAR	1992	A08498
POLAR	1992	13257A
POLAR	1993	102118A
POLAR	1993	15561A

Arrastres

MODELO	AÑO	NÚMERO DE TABLILLA
ROGERS	1993	61507A
FRUEHAUF	1996	121429A
SUMMIT	1997	28745A

SECCIÓN IV – CONDICIONES DE PERMISO

1. El poseedor cumplirá con todas las condiciones del permiso y cualquier incumplimiento constituirá una violación a este Reglamento y la Junta de Calidad Ambiental podrá llevar acciones para obligarlo a cumplir.

2. La Junta de Calidad Ambiental podrá modificar o revocar un permiso *motu propio*, o a solicitud del poseedor del permiso. Si en un término de quince (15) días laborables a partir del recibo de este permiso el poseedor no solicita la revocación, se entenderá que acepta las condiciones impuestas al mismo.

3. La Junta de Calidad Ambiental podrá solicitar al poseedor de un permiso que dentro de un término razonable provea cualquier información para determinar si existe causa para modificar o revocar, o para determinar si se está cumpliendo con sus términos.

4. Si el poseedor del permiso se percata de haber sometido alguna información incorrecta lo notificará inmediatamente a la Junta de Calidad Ambiental, y brindará la información completa y correcta dentro del término de cinco (5) días a partir del hallazgo.

5. El permiso de operar un servicio de recolección o transportación no será transferible, y para su renovación, el dueño u operador deberá someter la solicitud por lo menos sesenta (60) días antes de la fecha de expiración del permiso otorgado.

6. Toda modificación de permiso o información suplementaria requerida por la Junta de Calidad Ambiental deberá ser firmada y certificada por el dueño, o en el caso de una corporación, por el presidente, vicepresidente u oficial de más alto rango con oficinas en Puerto Rico, o un representante debidamente autorizado por escrito por uno de los funcionarios antes mencionados. En el caso de municipios u otras entidades no corporativas, por un oficial responsable o equivalente.

7. El poseedor del permiso deberá rotular los vehículos autorizados con el número del permiso otorgado, nombre de la empresa y número de teléfono en ambos lados del mismo. Los números y letras no serán menores de dos (2) pulgadas de alto y no serán susceptibles a ser removidos, excepto por destrucción.

8. Ninguna persona transportará desperdicios sólidos no peligrosos en forma tal que puedan derramarse o descargarse en una vía pública. Todos los vehículos que se usen para transportar desperdicios sólidos no peligrosos estarán diseñados de forma tal que el desperdicio quede completamente encerrado y tapado.

9. Ninguna persona ocasionará o permitirá la recolección o transportación de desperdicios sólidos no peligrosos sin antes tomar todas las medidas para evitar fuegos, explosiones, olores objetables y atracción de vectores, y evitar que éstos resulten desagradables a la vista.

10. Ninguna persona ocasionará o permitirá la disposición de desperdicios sólidos no peligrosos en sitio alguno que no sea una instalación autorizada por la Junta de Calidad Ambiental para manejar ese tipo de desperdicio mediante un permiso expedido de acuerdo al Reglamento antes mencionado.

11. Ninguna persona ocasionará o permitirá la recolección de desperdicios entre las horas de 10:00 PM a 6:00 AM, del siguiente día, en las zonas residenciales y de tranquilidad.

12. Si la solicitud de renovación se somete sesenta (60) días o más antes de la fecha de expiración del permiso, el mismo continuará vigente hasta la fecha de emisión del nuevo permiso y el poseedor continuará cumpliendo con todas las condiciones del permiso existente.

13. Toda solicitud de renovación de un permiso de operación que se presente desde el día cincuenta y nueve (59) hasta la fecha de vencimiento del permiso, tendrá el efecto de dejar sin vigencia el permiso existente una vez expirado. Además, dicha renovación conllevará un aumento en el cargo de un veinticinco por ciento (25%) sobre la cantidad correspondiente. Si la parte interesa continuar operando, deberá presentar una solicitud de permiso temporal de operación.

14. De expirarse el permiso, la instalación no podrá continuar operando. De interesar continuar operando, deberá presentar una solicitud para un nuevo permiso de operación y una solicitud de permiso temporal de operación.

15. Los transportistas tendrán que mantener disponible en sus camiones copia del plan de operación y del plan de emergencia o contingencia. Además, deberán tener conocimiento sobre el contenido de dichos planes y su correcta ejecución. El conocimiento de los planes, así como la correcta ejecución de los mismos, será condición exigible del permiso expedido.

16. Informará verbalmente cualquier incidente de incumplimiento con el RMDSNP al momento del hallazgo del incidente y entregará un informe escrito detallado en o antes de cinco (5) días a partir de la notificación. Los informes verbales y escritos describirán la naturaleza del incumplimiento, su causa, duración o duración anticipada si continúa, y todas las medidas que se hayan tomado para solucionar la situación, mitigar cualquier daño a la salud humana y para evitar que situaciones similares vuelvan a desarrollarse.

17. Informará verbalmente cualquier incidente del incumplimiento, su causa, duración o duración anticipada si continúa, y todas las medidas que se hayan tomado para solucionar la situación, mitigar cualquier daño a la salud humana o al ambiente y para evitar que situaciones similares vuelvan a desarrollarse.

SECCIÓN V – CONDICIONES ADICIONALES RELACIONADAS AL MANEJO DE NEUMÁTICOS DESECHADOS

1. Ninguna persona ocasionará o permitirá el almacenamiento, recolección, transportación, disposición o el manejo de neumáticos desechados sin antes tomar todas las medidas para evitar fuegos o incendios, explosiones, derrames, descargas de material con olores objetables y atracción de vectores. Se tomarán las medidas para evitar que el almacenamiento, recolección, transportación, disposición o manejo de neumáticos desechados se convierta en fuente de olores objetables y para evitar que éstos resulten desagradables a la vista.

2. Ninguna persona podrá causar o permitir la disposición o transportación de neumáticos desechados en o hacia instalaciones no autorizadas por la Junta ni endosadas por la Autoridad de Desperdicios Sólidos (ADS) para el manejo, disposición o uso de neumáticos desechados.

3. Ninguna persona podrá causar o permitir el almacenamiento, manejo, transportación, procesamiento, exportación, reciclaje, o uso final de neumáticos desechados en incumplimiento con los requisitos establecidos en el Reglamento para el Manejo Adecuado de Neumáticos (RMAN).

4. Ninguna persona podrá causar o permitir la alteración o falsificación de manifiestos, facturas u otros documentos requeridos por la Ley para el Manejo Adecuado de Neumáticos o por el RMAN.

5. Ninguna persona podrá causar o permitir la quema de neumáticos, excepto que: sea una instalación de recuperación de energía aprobada por la Junta y obtenga una certificación de la Autoridad; y cumpla con las leyes y los estándares federales y estatales para aire limpio y demás leyes ambientales, así como los reglamentos promulgados por la Junta y la Agencia Federal de Protección Ambiental (EPA, por sus siglas en inglés).

6. Ninguna persona podrá mezclar neumáticos desechados con cualquier sustancia o desperdicio peligroso que lo descalifique para poder ser reciclado o para cualquier otro uso.

7. Ninguna persona podrá someter información falsa o errónea, o incluir o permitir que se incluya, información falsa o errónea en ningún documento sometido por virtud del Reglamento. Ninguna persona tampoco permitirá que este tipo de información le sea sometida de forma alguna a funcionarios de la Junta.

8. Ninguna persona podrá ocasionar o permitir la generación, el almacenamiento, la recolección, la transportación, la recuperación, la disposición o el manejo de neumáticos desechados en forma tal que afecte o destruya cualquier especie de planta o animal que se encuentre amenazada o en peligro de extinción, o que cause o contribuya a la modificación o destrucción de su habitáculo.

9. Ninguna persona ocasionará o permitirá la dispersión, derrame, depósito, disposición o acumulación de neumáticos desechados en ningún predio, acera, vía de acceso pública o privada, cunetas, calles o cualquier sitio no autorizado por la Junta. Ninguna persona podrá ocasionar o permitir la recolección, recuperación, almacenamiento o disposición de neumáticos desechados en vertederos clandestinos o sitio alguno que no sea: Una instalación autorizada por la Junta para manejar neumáticos desechados mediante un permiso expedido de acuerdo con el Reglamento; Dentro del edificio donde se originen los neumáticos desechados.

10. Recogerá los neumáticos desechados solamente de aquellos almacenadores que cuenten con la autorización y el permiso otorgado por la Junta. Trasferirán dichos neumáticos a aquellas instalaciones de procesamiento, reciclaje, exportación o de uso final que estén debidamente autorizados para ello por la Junta y cuyas balanzas estén certificadas por DACO o la Agencia pertinente.

11. Se asegurará que el camión o vagón en el que se acarreen los neumáticos desechados sea pesado antes y después de la entrega de los mismos en las instalaciones de procesamiento, reciclaje, exportación o uso final.

12. Acompañara con el manifiesto de la Junta para neumáticos desechados todo cargamento de estos neumáticos que sea recogido en un centro de almacenamiento para ser transportado a una de las instalaciones autorizadas para recibirlos. Firmará y mantendrá durante cinco (5) años, copia del manifiesto que indique la cantidad de neumáticos recibidos del transportista y su equivalente en peso.

13. En caso de que los neumáticos desechados caigan accidentalmente en la vía de rodaje durante su transportación, el transportista tomará inmediatamente todas las medidas necesarias para proteger la seguridad pública. Esto incluye recoger inmediatamente todo neumático desechado entero o procesado.

14. No podrá acumular más de la cantidad de neumáticos desechados o su equivalente en libras que establezca la Junta en este permiso: **hasta un máximo de NOVECIENTOS CUARENTA Y OCHO (948) neumáticos desechados entre pasajero y camiones o DIECINUEVE MIL NOVECIENTAS OCHO (19,908) libras.** Se aplicará el criterio más restrictivo entre ambas opciones.

SECCIÓN VI – APROBACIÓN Y VIGENCIA DEL PERMISO

Esta Junta de Calidad Ambiental autoriza al **Sr. Eduardo Fraticelli Alvarado,** Gerente General de la empresa, a operar un servicio de recolección o transportación de desperdicios no peligrosos en las zonas y puntos establecidos en el Plan de Operación sometido, por un período de tres (3) años. La fecha de vigencia comienza el **8 de noviembre de 2012** y expira el **8 de noviembre de 2015.**

Este permiso está condicionado a que la entidad autorizada demuestre a satisfacción de esta Junta, que la actividad de recolección y transportación está y permanecerá en cumplimiento con todos los reglamentos aplicables y con el Plan de Operación y Emergencia aprobado por esta Junta y conlleva la aceptación de las condiciones presentadas en el anejo que acompaña a este documento.

La Junta de Calidad Ambiental podrá suspender o revocar este permiso de operación si se comprueba que se ha incurrido en alguna violación de las reglas o reglamentos vigentes y que no se esté cumpliendo con las condiciones estipuladas en este permiso.

La Junta se reserva el derecho de intervenir con el servicio de recolección y transportación en otros aspectos no cubiertos en la autorización.

Otorgado en Ponce, San Juan el **8 de noviembre de 2012.**

Junta de Calidad Ambiental

Lcda. Blanche González Hodge
Miembro Asociado

Sr. Reynaldo Matos Jiménez
Miembro Asociado

Lcdo. Pedro J. Nieves Miranda
Presidente

APPENDIX D

WM EZ Profile Form

WASTE MANAGEMENT

EZ Profile™

Requested Facility: _____ ❑ Unsure Profile Number: _____

❑ Check if there are multiple generator locations. Attach locations. ❑ COD ❑ Renewal? Original Profile Number: _____

A. GENERATOR INFORMATION (MATERIAL ORIGIN)

1. Generator Name: _____
2. Site Address: _____
   (City, State, ZIP) _____
3. County: _____
4. Contact Name: _____
5. Email: _____
6. Phone: _____ 7. Fax: _____
8. Generator EPA ID: _____ ❑ N/A
9. State ID: _____ ❑ N/A

B. BILLING INFORMATION ❑ **SAME AS GENERATOR**

1. Billing Name: _____
2. Billing Address: _____
   (City, State, ZIP) _____
3. Contact Name: _____
4. Email: _____
5. Phone: _____ 6. Fax: _____
7. WM Hauled? ❑ Yes ❑ No
8. P.O. Number: _____

C. MATERIAL INFORMATION

1. Common Name: _____
   Describe Process Generating Material: ❑ See Attached
2. Material Composition and Contaminants: ❑ See Attached

1.	
2.	
3.	
4.	
	≥100%

3. State Waste Codes: _____ ❑ N/A
4. Color: _____
5. Physical State at 70°F: ❑ Solid ❑ Liquid ❑ Other: _____
6. Free Liquid Range Percentage: _____ to _____ ❑ N/A (Solid)
7. pH: _____ to _____ ❑ N/A (Solid)
8. Strong Odor: ❑ Yes ❑ No Describe: _____
9. Flash Point: ❑ <140°F ❑ 140°–199°F ❑ ≥200° ❑ N/A (Solid)

D. REGULATORY INFORMATION

1. EPA Hazardous Waste? ❑ Yes* ❑ No
   Code: _____
2. State Hazardous Waste? ❑ Yes ❑ No
   Code: _____
3. Is this material non-hazardous due to Treatment, Delisting, or an Exclusion? ❑ Yes* ❑ No
4. Contains Underlying Hazardous Constituents? ❑ Yes* ❑ No
5. Contains benzene **and** subject to Benzene NESHAP? ❑ Yes* ❑ No
6. Facility remediation subject to 40 CFR 63 GGGGG? ❑ Yes* ❑ No
7. CERCLA or State-mandated clean-up? ❑ Yes* ❑ No
8. NRC or State-regulated radioactive or NORM waste? ❑ Yes* ❑ No

***If Yes, see Addendum (page 2) for additional questions and space.**

9. Contains PCBs? → If Yes, answer a, b and c. ❑ Yes ❑ No
   a. Regulated by 40 CFR 761? ❑ Yes ❑ No
   b. Remediation under 40 CFR 761.61 (a)? ❑ Yes ❑ No
   c. Were PCB imported into the US? ❑ Yes ❑ No
10. Regulated and/or Untreated Medical/Infectious Waste? ❑ Yes ❑ No
11. Contains Asbestos? ❑ Yes ❑ No
    → If Yes: ❑ Non-Friable ❑ Non-Friable – Regulated ❑ Friable

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION

1. Analytical attached ❑ Yes
   Please identify applicable samples and/or lab reports:
2. Other information attached (such as MSDS)? ❑ Yes

F. SHIPPING AND DOT INFORMATION

1. ❑ One-Time Event ❑ Repeat Event/Ongoing Business
2. Estimated Quantity/Unit of Measure: _____
   ❑ Tons ❑ Yards ❑ Drums ❑ Gallons ❑ Other: _____
3. Container Type and Size: _____
4. USDOT Proper Shipping Name: ❑ N/A
   _____

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)

By signing this EZ Profile™ form, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to Waste Management prior to providing the material to Waste Management.

If I am an agent signing on behalf of the Generator, I have confirmed with the Generator that information contained in this Profile is accurate and complete.

Name (Print): _____ Date: _____

Title: _____

Company: _____

Certification Signature

THINK GREEN.®

QUESTIONS? CALL 800 963 4776 FOR ASSISTANCE

Last Revised April 26, 2013

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EZ Profile™ Addendum

WASTE MANAGEMENT

Only complete this Addendum if prompted by responses on EZ Profile™ (page 1) or to provide additional information. Sections and question numbers correspond to EZ Profile™.

Profile Number: _____

C. MATERIAL INFORMATION

Describe Process Generating Material (Continued from page 1): If more space is needed, please attach additional pages.

Material Composition and Contaminants (Continued from page 1): If more space is needed, please attach additional pages.

5.	
6.	
7.	
8.	
9.	
10.	
	≥100%

D. REGULATORY INFORMATION

Only questions with a "Yes" response in Section D on the EZ Profile™ form (page 1) need to be answered here.

1. EPA Hazardous Waste
   a. Please list all USEPA listed and characteristic waste code numbers:
   b. Is the material subject to the Alternative Debris standards (40 CFR 268.45)? ❑ Yes ❑ No
   c. Is the material subject to the Alternative Soil standards (40 CFR 268.49)? → If Yes, complete question 4. ❑ Yes ❑ No
   d. Is the material exempt from Subpart CC Controls (40 CFR 264.1083 and 265.1084)? ❑ Yes ❑ No
      → If Yes, please select one of the following:
      ❑ Waste has been determined to be LDR exempt [265.1083(c)(4) and 265.1084(c)(4)] based on the fact that it meets all applicable organic treatment standards (including UHCs for D-coded characteristic wastes) or a Specified Technology has been utilized.
      ❑ Waste does not qualify for a LDR exemption, but the average VOC at the point of origination is <500 ppmw and this determination was based on analytical testing (upload copy of analysis) or generator knowledge.
2. State Hazardous Waste → Please list all state waste codes: _____
3. For material that is Treated, Delisted, or Excluded → Please indicate the category, below:
   ❑ Delisted Hazardous Waste ❑ Excluded Waste under 40 CFR 261.4 → Specify Exclusion: _____
   ❑ Treated Hazardous Waste Debris ❑ Treated Characteristic Hazardous Waste → If checked, complete question 4.
4. Underlying Hazardous Constituents → Please list all Underlying Hazardous Constituents:
5. Benzene NESHAP → Please include percent water/moisture in chemical composition.
   a. Are you a TSDF? → If yes, please complete Benzene NESHAP questionnaire. If not, continue.
   b. What is your facility's current total annual benzene quantity in Megagrams? ❑ <1 Mg ❑ 1–9.99 Mg ❑ ≥10 Mg
      1. Flow weighted average benzene concentration is _____ ppmw.
   c. Is this waste soil from remediation at a closed facility? ❑ Yes ❑ No
      1. Benzene concentration in remediation waste is _____ ppmw.
   d. Has material been treated to remove 99% of the benzene or to achieve <10 ppmw? ❑ Yes ❑ No
   e. Is material exempt from controls in accordance with 40 CFR 61.342? ❑ Yes ❑ No
      → If yes, specify exemption: _____
   f. Based on your knowledge of your waste and the 8WON regulations, do you believe that this waste stream is subject to treatment and control requirements at an off-site TSDF? ❑ Yes ❑ No
6. 40 CFR 63 GGGGG → Does the material contain <500 ppmw VOHAPs at the point of determination? ❑ Yes ❑ No
7. CERCLA or State-Mandated clean up → Please submit the Record of Decision or other documentation to assist others in the evaluation for proper disposal.
8. NRC or state regulated radioactive or NORM Waste → Please identify Isotopes and pCi/g: _____

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WASTE MANAGEMENT

Additional Profile Information

Profile Number: _____

C. MATERIAL INFORMATION

Material Composition and Contaminants (Continued from page 2): If more space is needed, please attach additional pages.

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39.	
40.	
	≥100%

D. REGULATORY INFORMATION

1. EPA Hazardous Waste
   a. Please list all USEPA listed and characteristic waste code numbers (Continued from page 2):

THINK GREEN.®

QUESTIONS? CALL 800 963 4776 FOR ASSISTANCE

Last Revised April 26, 2013
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APPENDIX E

El Coqui Landfill Acceptance Doc

NON-HAZARDOUS WASTE TRANSPORTATION/ACCEPTANCE DOCUMENT

DATE _____

TO: **EL COQUI LANDFILL**	FROM:
Carr. 923 Km. 1.7 Bo. Buena Vista	
Humacao, Puerto Rico	
787-852-4444 — FACILITY PERMIT NO. **IDF-36-0016**	P.O. NO.

No. of Units & Container Type	DESCRIPTION AND CLASSIFICATION OF WASTE MATERIAL	Waste Profile Sheet Code	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)

GENERATOR'S CERTIFICATION: This is to certify that the above named materials are properly classified, described, marked and labeled and are in proper condition for transportantion according to the applicable regulations of the Department of Transportation, U.S. EPA and the Commonwealth of P.R. The waste described above were consigned to the Transporter named. The Treatment, Storage or Disposal Facility can and will accept the shipment of waste, and has a valid permit to do so. I certify that the foregoing is true and correct to the best of my knowledge.

GENERATOR'S SIGNATURE	TITLE	DATE SHIPPED MO. DAY YR	EXPECTED ARRIVAL DATE MO. DAY YR
TRANSPORTE SIGNATURE	COMPANY NAME	VEHICLE ID. NO.	DATE RECEIVED MO. DAY YR
FACILITY SIGNATURE			DATE RECEIVED MO. DAY YR

WM FILE

APPENDIX F

Disposal Log

USN CONTRACT NO. N69470-12-D-7016
UXO 1`SWMU 77 DISPOSAL LOG
NON-HAZ WASTE

Date	Manifest #	Vehicle #	Disposal Facility	Quantity c/y	GVW	TW	Net in Pounds	Total Tons
			Waste Management					
			Waste Management					
			Waste Management					
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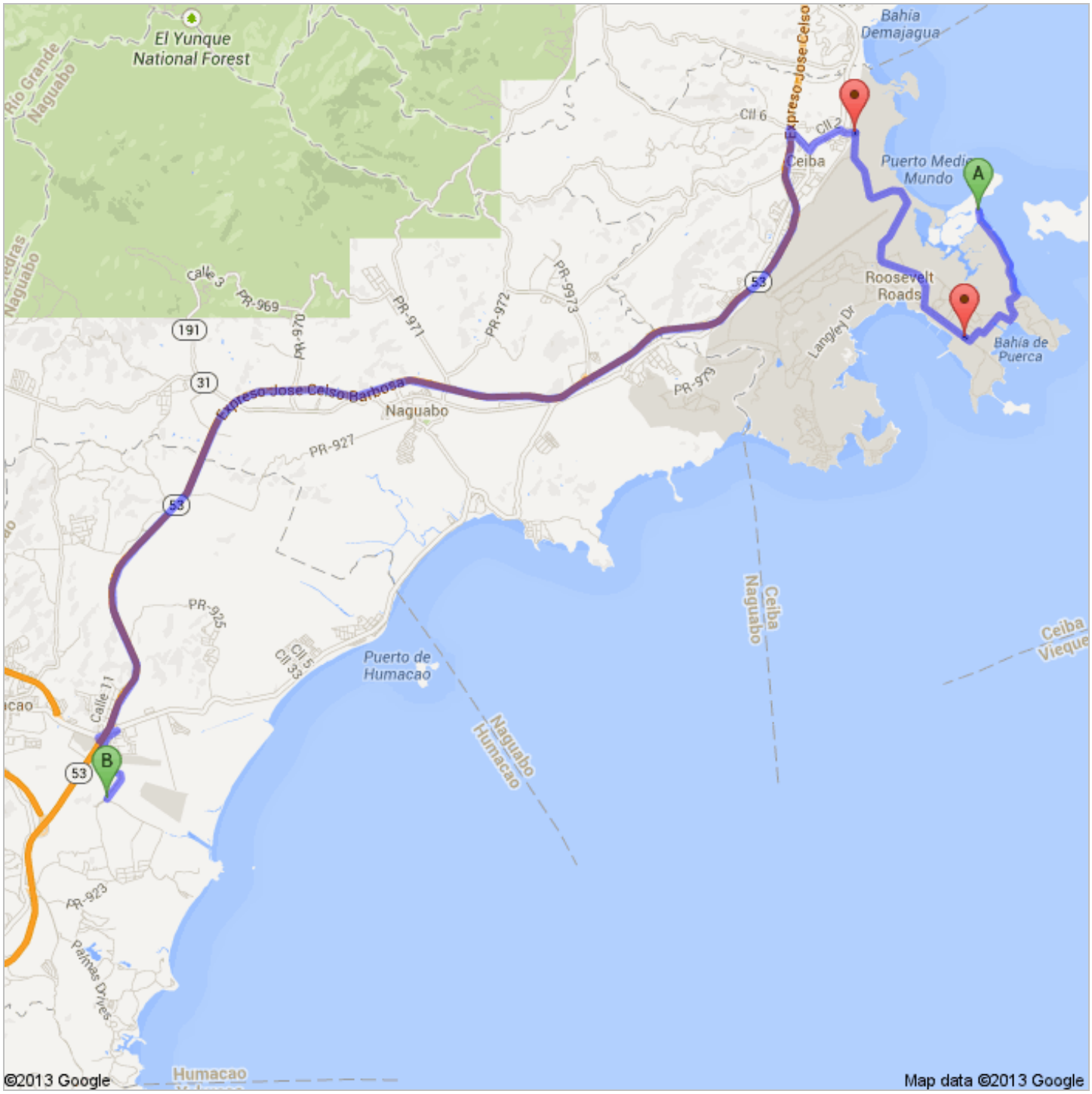
			Waste Management					

APPENDIX G

Transportation Route

Directions to PR-923
43.2 km – about 44 mins



Unknown road

	1. Head south About 5 mins	go 3.4 km total 3.4 km
	2. Turn left About 1 min	go 650 m total 4.1 km
	3. Turn left About 46 secs	go 350 m total 4.4 km
	4. Take the 3rd right About 3 mins	go 1.3 km total 5.7 km
	5. Slight right toward Forrestal Dr About 1 min	go 850 m total 6.6 km
	6. Turn left onto Forrestal Dr About 2 mins	go 850 m total 7.4 km
	7. Slight right onto Tarawa Dr About 7 mins	go 4.4 km total 11.8 km
	8. Turn left onto Cll Isabel Rosada	go 230 m total 12.0 km
	9. Continue straight onto Cll Feliza Rincon De Gautier	go 160 m total 12.2 km
	10. Turn left onto PR-979 About 2 mins	go 900 m total 13.1 km
	11. Take the 2nd right onto Cam Río Abajo/PR-975 Continue to follow PR-975 About 58 secs	go 700 m total 13.8 km
	12. Turn left onto the ramp to Expreso Jose Celso Barbosa/PR-53 S	go 100 m total 13.9 km
53	13. Keep left at the fork and merge onto Expreso Jose Celso Barbosa/PR-53 S About 15 mins	go 26.4 km total 40.3 km
	14. Take the exit toward Calle Dr. Vidal	go 240 m total 40.5 km
	15. Turn right onto Calle Dr. Vidal	go 400 m total 40.9 km
	16. Take the 1st right toward Cll Marginal Oeste	go 52 m total 41.0 km
	17. Take the 1st right onto Cll Marginal Oeste About 1 min	go 900 m total 41.9 km
	18. Continue onto PR-923 About 2 mins	go 1.4 km total 43.2 km

PR-923

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2013 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

APPENDIX H

Waste-Sampling SOP

Region 4
U.S. Environmental Protection Agency
Science and Ecosystem Support Division
Athens, Georgia

OPERATING PROCEDURE

Title: **Waste Sampling**

Effective Date: January 29, 2013	**Number:** SESDPROC-302-R2

Authors

Name: Mike Neill
Title: Environmental Scientist, Regional Expert
Signature: Mike Neill Date: 1/29/13

Approvals

Name: Danny France
Title: Chief, Enforcement and Investigations Branch
Signature: Danny France Date: 1/29/13

Name: Bobby Lewis
Title: Field Quality Manager, Science and Ecosystem Support Division
Signature: Bobby Lewis Date: 1/29/13

Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the SESD Document Control Coordinator.

History	Effective Date
SESDPROC-302-R2, *Waste Sampling*, replaces SESDPROC-302-R1. **General:** Corrected any typographical, grammatical and/or editorial errors. **Cover Page:** The EIB Branch Chief was changed from Antonio Quinones to Danny France. The FQM was changed from Laura Ackerman to Bobby Lewis. **Revision History:** Previous versions of the document will be maintained by the Document Control Coordinator (DCC). Changed from Field Quality Manager to DCC. **Section 1.2:** Added the following statement: Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use. **Section 1.3:** Changed requirement so that the DCC is responsible for ensuring the most recent version of the procedure is placed on the SESD LAN and for maintaining records of review conducted prior to its issuance. Deleted reference to the H: drive. **Section 1.4:** Updated ASTM and CFR references to include "Most Recent Version." Updated Title 40 Code of Federal Regulations reference from "Pts. 260 to 268" to "Pts. 260 to 282" **Section 1.5.2, 1st bullet:** Removed the last sentence which stated "Samples will be custody sealed during long-term storage or shipment." **Section 1.5.2, last bullet:** Removed the bullet which stated **"**All shipping documents, such as air bills, bills of lading, etc., will be retained by the project leader and stored in a secure place." **Section 1.6, 2nd and 3rd sentence:** Replaced the word "should" with "will." **Section 1.7, last sentence:** Replaced the word "should" with "will." **Section 2.2, 1st paragraph:** Changed "Besides" to "In addition to." **Section 2.2.1, last paragraph:** Inserted paragraph to address the collection of industrial process water samples from open units. **Section 4.3, Step 7, <u>Liquids</u>, second to last sentence:** Sentence was modified to be more specific in releasing the full contents from the COLIWASA device into one sample container. **Section 4.3, Step 7 & Section 4.4, Step 9 - last paragraph, third sentences:**	January 29, 2013

On both Sections, sentences were modified to specify "non-disposable" equipment. **Section 4.4, 2nd paragraph:** Added "Because wastes often stratify due to different densities of phases or settling of solids, it may be important to obtain a vertical cross section of the entire unit, or it may be desirable to collect grab samples from each strata." **Section 4.5, last paragraph:** Removed the specific reference to Section 2.5 of the SESD OP for Soil Sampling (SESDPROC-300). **Section 5.1, 1st paragraph:** In the second sentence, changed "manual" to "protocol." **Section 5.1, 2nd paragraph:** In the second sentence, replaced "…each sample container should be tagged and sealed, placed in a plastic bag, and the bag securely closed" with "…each sample container should be labeledin accordance with Section 3.3 of the SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005 (Most Resent Version) and placed in a plastic bag. The bag should be securely closed." In the last sentence added "(Most Recent Version)" to SESDPROC-209 reference. In the 4th sentence, the term hazardous "characteristics" was changed to hazardous "properties" to avoid regulatory confusion. **Section 5.1, 3rd paragraph:** In the second sentence added "or detected to have strong chemical odor." In the third sentence, replaced "The tagged, sealed and bagged samples…" with "The bagged samples…" **Section 6.1, 2nd paragraph:** The second sentence added "(Most Recent Version)" to SESDPROC-005 reference. The last sentence ("The bag should then be sealed with a custody seal) was deleted. **Section6.1, 3rd paragraph:** First sentence changed "the" to "SESD's." **Section 6.1, step 5:** Removed the specific reference to Section 2.5 of the SESD OP for Soil Sampling (SESDPROC-300). **Section 6.1, step 6:** Modified to include the use of labels.	

SESDPROC-302-R1, *Waste Sampling*, replaces SESDPROC-302-R0. **General** Corrected any typographical, grammatical and/or editorial errors. **Title Page** Changed title for Antonio Quinones from Environmental Investigations Branch to Enforcement and Investigations Branch. **Section 1.3** Updated information to reflect that the procedure is located on the H: drive of the LAN. Clarified Field Quality Manager (FQM) responsibilities. **Section 1.4** Updated referenced operating procedures due to changes in title names. Alphabetized and revised the referencing style for consistency. Added one reference (49 CFR). **Section 1.5.1** Corrected the title of the Safety, Health, and Environmental Management Program Procedures and Policy Manual. **Section 1.5.2, 4th bullet** Added references to the CFR and IATA's Dangerous Goods Regulations. **Sections 1.6 and 1.7** Updated referenced operating procedures due to changes in title names. **Sections 1.8** Added references to SESDPROC-002, 010 and 005.	November 1, 2007
SESDPROC-302-R0, Waste Sampling, Original Issue	February 05, 2007

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1 General Information

1.1 Purpose

This document describes general and specific procedures, methods and considerations to be used and observed when collecting waste samples for field screening or laboratory analysis.

1.2 Scope/Application

The procedures contained in this document are to be used by field personnel when collecting and handling waste samples in the field. On the occasion that SESD field investigators determine that any of the procedures described in this section are inappropriate, inadequate or impractical and that another procedure must be used to obtain a waste sample, the variant procedure will be documented in the field logbook, along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and have been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on SESD's local area network (LAN). The Document Control coordinator is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

1.4 References

ASTM. 2000. Manual 42, RCRA Waste Management: Planning, Implementation and Assessment of Sampling Activities, Cosgrove, Neill and Hastie, West Conshohocken, PA.

ASTM, Standard Guide for Sampling Strategies for Heterogeneous Wastes, D 5956, Most Recent Version.

ASTM, Standard Guide for Selection of Sampling Equipment for Wastes and Contaminated Media Data Collection Activities, D 6232, Most Recent Version.

Federal Register, Volume 55, Issue 26, Friday, June 29, 1990: Page 26990.

International Air Transport Authority (IATA). Dangerous Goods Regulations, Most Recent Version.

SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005, Most Recent Version.

SESD Operating Procedure for Logbooks, SESDPROC-010, Most Recent Version.

SESD Operating Procedure for Field Sampling Quality Control, SESDPROC-011, Most Recent Version.

SESD Operating Procedure for Equipment Inventory and Management, SESDPROC-108, Most Recent Version.

SESD Operating Procedure for Management of Investigation Derived Waste, SESDPROC-202, Most Recent Version.

SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205, Most Recent Version.

SESD Operating Procedure for Field Equipment Cleaning and Decontamination at the FEC, SESDPROC-206, Most Recent Version.

SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209, Most Recent Version.

SESD Operating Procedure for Soil Sampling, SESDPROC-300, Most Recent Version.

SESD Operating Procedure for Wipe Sampling, SESDPROC-304, Most Recent Version.

Title 40 Code of Federal Regulations, Pts. 260 to 282, US EPA, Most Recent Version.

Title 49 Code of Federal Regulations, Pts. 171 to 179, Most Recent Version.

United States Environmental Protection Agency (US EPA). 1981. "Final Regulation Package for Compliance with DOT Regulations in the Shipment of Environmental Laboratory Samples," Memo from David Weitzman, Work Group Chairman, Office of Occupational Health and Safety (PM-273), April 13, 1981.

US EPA. 1995. SUPERFUND PROGRAM Representative Sampling Guidance Volume 4: Waste, Interim Final US-EPA, EPA/540/R95/141 (OSWER Directive 9360.4-14), December 1995.

US EPA. 2000. Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (SW-846), Third Edition, Draft Update IVB, US-EPA, Office of Solid Waste and Emergency Response, Washington, D.C., November, 2000.

US EPA. 2001. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. Region 4 Science and Ecosystem Support Division (SESD), Athens, GA.

US EPA. Analytical Support Branch Laboratory Operations and Quality Assurance Manual. Region 4 SESD, Athens, GA, Most Recent Version.

US EPA. Safety, Health and Environmental Management Program Procedures and Policy Manual. Region 4 SESD, Athens, GA, Most Recent Version.

1.5 General Precautions

1.5.1 Safety

Proper safety precautions must be observed when collecting waste samples. Refer to the SESD Safety, Health and Environmental Management Program (SHEMP) Procedures and Policy Manual and any pertinent site-specific Health and Safety Plans (HASP) for guidelines on safety precautions. These guidelines, however, should only be used to complement the judgment of an experienced professional. Sampling of waste units should be assessed for potential hazards by both the project leader and the site safety officer (SSO). It is the SSO's responsibility to enforce the site safety plan, and to ensure that procedures used during waste sampling are in accordance with Branch safety procedures and protocols found in the SESD SHEMP Procedures and Policy Manual and the HASP.

When using this procedure, minimize exposure to potential health hazards through the use of protective clothing, eye wear and gloves. Address chemicals that pose specific toxicity or safety concerns and follow any other relevant requirements, as appropriate. Specific levels of dress for waste sampling will be described in greater detail later in this operating procedure.

Sampling equipment contaminated during waste sampling investigations should be cleaned in accordance with the SESD Operating Procedure for Field Equipment Cleaning and Decontamination (SESDPROC-205). Contaminated sampling equipment that is to be discarded must be properly disposed according to the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202). These procedures should be specified in the site-specific study plan or Quality Assurance Project Plan.

1.5.2 Procedural Precautions

The following precautions should be considered when collecting waste samples.

- Special care must be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample.
- Collected samples must remain in the custody of the sampler or sample custodian until the samples are relinquished to another party.
- If samples are transported by the sampler, they will remain under his/her custody or be secured until they are relinquished.

- Shipped samples will conform to all U.S. Department of Transportation (DOT) rules of shipment found in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179), and/or International Air Transportation Association (IATA) hazardous materials shipping requirements found in the current edition of IATA's Dangerous Goods Regulations.
- Documentation of field sampling is done in a bound logbook.
- Chain-of-custody documents will be filled out and remain with the samples until custody is relinquished.

1.6 Quality Control Procedures

In some instances, special decontamination procedures will be necessary and should be developed on a case-by-case basis according to the specific material encountered. Any cleaning procedures and equipment repairs conducted in the field, which deviate from those specified in the SESD Operating Procedure for Field Equipment Cleaning and Decontamination (SESDPROC-205) or the study plan, will be thoroughly documented in the logbooks. Equipment blanks will be collected in accordance with the SESD Operating Procedure for Field Sampling Quality Control (SESDPROC-011) if equipment is field cleaned and re-used on-site or if necessary to document that low-level contaminants were not introduced by any sampling equipment. All air monitoring and field analytical/screening equipment should be checked and calibrated before being issued for field studies, as specified in the SESD Operating Procedure for Equipment Inventory and Management (SESDPROC-108).

1.7 Auxiliary Information and Data Collection

The collection of auxiliary information and data is particularly important when collecting waste samples. Any field analyses or field screening results should be recorded in a logbook as outlined in the SESD Operating Procedure for Logbooks (SESDPROC-010). Sketches of waste units, sampling locations, containers, tanks and ancillary equipment, markings/labels, etc., should be fully documented in logbooks. Photographs are extremely useful for recording this information and may be used during waste sampling operations. A field log of the photographs taken will be maintained as outlined in the SESD Operating Procedure for Logbooks (SESDPROC-010).

1.8 Records

Information generated or obtained by SESD personnel will be organized and accounted for in accordance with SESD records management procedures found in the SESD Operating Procedure for Control of Records (SESDPROC-002). Field notes, recorded in a bound field logbook, will be generated, as well as chain-of-custody documentation in accordance with the SESD Operating Procedure for Logbooks (SESDPROC-010) and the SESD Operating Procedure for Sample and Evidence Management (SESDPROC-005).

1.9 Investigation Derived Waste

Sampling and decontamination can generate investigation derived waste (IDW), the disposition of which must be considered. See the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202) for guidance on management or disposal of this waste.

2 Waste Sampling - Background

2.1 General

Hazardous wastes are regulated by the USEPA under 40 CFR Parts 260-282. As a consequence, many of the methods that are used to manage, store, treat and dispose hazardous wastes and potential hazardous wastes are of concern to both the regulators and the regulated community.

Samples are often required of regulated or potentially regulated materials. While it is understood that each facility and wastestream may present its own unique sampling and analytical challenges, this operating procedure will list equipment and procedures that have been used to safely and successfully sample specific waste units.

2.2 Waste Unit Types

Waste management units can be generally categorized into two types: open and closed. In practice, open units are larger than closed units. Open units include waste piles and surface impoundments whereas closed units include containers and tanks as well as ancillary tank equipment. In addition to containers and tanks, sumps may also be considered closed units because they are designed to collect the spillage of liquid wastes and are sometimes configured as a confined space.

Although both may pose hazards, units that are open to the environment are generally less hazardous than closed units. Sampling of closed units is considered a higher hazard risk because of the potential of exposure to toxic gases and flammable/explosive atmospheres. Because closed units prevent the dilution of the wastes by environmental influences, they are more likely to contain materials that have concentrated levels of hazardous constituents. While opening closed units for sampling purposes when the unit's contents are unknown, investigators will use Level B personal protective equipment (PPE) and air monitoring instruments to ensure that the working environment does not contain hazardous levels of flammable/explosive gases or toxic vapors, and follow the appropriate safety requirements stipulated in the site specific safety plan.

Buried waste materials should be located and excavated with extreme caution. Once the buried waste is uncovered, the appropriate safety and sampling procedures utilized will depend on the type of waste unit.

2.2.1 Open Units

While open units may contain many types of wastes and come in a variety of shapes and sizes, they can be generally regarded as either waste piles or surface impoundments. Definitions of these two types of open units from 40 CFR Part 260.10 are:

- (Waste) pile - any non-containerized accumulation of solid, non-flowing hazardous waste that is used for treatment or storage and that is not a containment building.

- Surface impoundment - "...a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold the accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling and aeration pits, ponds, and lagoons."

One of the distinguishing features between waste piles and surface impoundments is the state of the waste. Waste piles typically contain solid or non-flowing materials whereas liquid wastes are usually contained in surface impoundments. The nature of the waste will also determine the mode of delivering the waste to the unit. Wastes are commonly pumped or gravity fed into impoundments while heavy equipment or trucks may be used to dump wastes in piles. Once the waste has been placed in an open unit, the state of the waste may be altered by environmental factors (e.g., temperature, precipitation, etc.).

Surface impoundments may contain several phases such as floating solids, liquid phase(s) and sludges. Waste piles are usually restricted to solids and semi-solids. All of the potential phases contained in a waste unit should be considered in developing the sample design to meet the study's objective.

During RCRA compliance investigations, it is common to collect waste samples from industrial process areas and from surface impoundments. Frequently these materials may be liquids or process waters conveying wastes from industrial processes or pollution control devices to open units. These industrial process water samples may be collected to determine the point of generation or compliance with the RCRA regulations.

2.2.2 Closed Units

There are a variety of designs, shapes, sizes and functions of closed units. In addition to the challenges of the various designs and the safety requirements for sampling them, closed units are difficult to sample because they may contain liquid, solid, semi-solid/sludge or any combination of phases. Based on the study's design, it may be necessary to obtain a cross-sectional profile of the closed unit in an attempt to characterize the unit. The following are definitions of types of closed waste units described in 40 CFR Part 260.10:

- Container - any portable device in which a material is stored, transported, treated, disposed, or otherwise handled. Examples of containers are drums, overpacks, pails, totes and roll-offs.
- Tank - a stationary device, designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials which provide structural support.

  Portable tanks, tank trucks and tank cars vary in size and may range from simple to extremely complex designs. Depending on the unit's design, it may be convenient to

consider some of these storage units as tanks for sampling purposes even though they meet the definition of a container.

- Ancillary equipment (tank) - any device including, but not limited to, such devices as piping, fittings, flanges, valves and pumps that is used to distribute, meter or control the flow of hazardous waste from its point of generation to a storage or treatment tank(s), between hazardous waste storage and treatment tanks to a point of disposal on-site, or to a point of shipment for disposal off-site.
- Sump - any pit or reservoir that meets the definition of a tank and those troughs/trenches connected to it that serve to collect hazardous wastes.

  Note: some outdoor sumps may be considered open units/surface impoundments.

Although any of the closed units may not be completely sealed and may be partially open to the environment, the unit should be treated as a closed unit for sampling purposes until a true determination can be made. Once a closed unit is opened, a review of the proposed sampling procedures and level of protection can be performed to determine if the personal protective equipment is suitable for the site conditions.

Samples collected from different waste units should not be composited into one sample container without additional analytical and/or field screening data to determine if the materials are compatible and will not cause an inadvertent chemical reaction.

3 Waste Sampling Equipment

3.1 General

Selecting appropriate equipment to sample wastes is a challenging task due to the uncertainty of the physical characteristics and nature of the wastes. It may be difficult to separate, homogenize and/or containerize a waste due to its physical characteristics (viscosity, particle size, etc.). In addition, the physical characteristics of a waste may change with temperature, humidity or pressure. Waste streams may vary depending on how and when a waste was generated, how and where it was stored/disposed and the conditions under which it was stored/disposed. Also, the physical location of the wastes or the unit configuration may prevent the use of conventional sampling equipment.

Given the uncertainties that a waste may present, it is desirable to select sampling equipment that will facilitate the collection of samples that will meet the study's objective, and that will not unintentionally bias the sample by excluding some of the sample population that is under consideration. However, due to the nature of some waste matrices or the physical constraints of some waste units, it may be necessary to collect samples knowing that a portion of the desired population was omitted due to limitations of the equipment. Any deviations from the study plan or difficulties encountered in the field concerning sample collection that may have an effect on the study's objective should be documented in a logbook, reviewed with the analytical data and presented in the report.

3.1.1 Waste Sampling Equipment

Waste sampling equipment should be made of non-reactive materials that will neither add to nor alter the chemical or physical properties of the material that is being sampled. Table 1 lists some conventional equipment for sampling waste units/ phases and some potential limitations of the equipment. Another reference for selecting sampling equipment is the ASTM, *Standard Guide for Selection of Sampling Equipment for Wastes and Contaminated Media Data Collection Activities*, D 6232, most recent version.

3.1.2 Ancillary Equipment for Waste Sampling

In addition to the equipment listed in Table 1 which provides the primary device used to collect various waste samples, ancillary equipment may be required during the sampling for safety and/or analytical reasons. Some examples of these types of equipment are glass mixing pans, particle size reducers, remote drum opening devices and spark resistant tools. Any influences that these types of ancillary equipment may have on the data should be evaluated and reported as necessary.

4 Waste Sampling Procedures

4.1 Waste Piles

Waste piles vary in size, shape, composition and compactness, and may vary in distribution of hazardous constituents and characteristics (strata). These variables will affect safety and access considerations. The number of samples, the type of sample(s), the sample location(s) and interval(s) should be based on the study's objectives. Commonly used equipment to collect samples from waste piles is listed in Table 1. Specific procedures will vary depending on the equipment and objectives of the investigation. All equipment should be compatible with the waste and should be cleaned to prevent cross contamination of the sample.

4.2 Surface Impoundments

Surface impoundments vary in size, shape and waste content, and may vary in distribution of hazardous constituents and characteristics (strata). The number of samples, the type of sample(s) and the sample location(s) and interval(s) should be based on the study's objectives. Commonly used equipment to collect samples from surface impoundments is listed in Table 1. Specific procedures will vary depending on the equipment and objectives of the investigation. All equipment should be compatible with the waste and should be cleaned to prevent cross contamination of the sample.

Because of the potential danger of sampling waste units suspected of containing elevated levels of hazardous constituents, personnel should never attempt to sample surface impoundments used to manage potentially hazardous wastes from a boat. All sampling should be conducted from the banks or piers of surface impoundments. Any exception must be approved by the appropriate site safety officer and/or the Occupational Health and Safety Designee (OHSD).

4.3 Drums

Drums are the most frequent type of containers sampled by field investigators for chemical analyses and/or physical testing. Caution should be exercised by the field investigators when sampling drums because of the potential presence of explosive/flammable gases and/or toxic vapors. Therefore, the following procedures should be used when collecting samples from drums of unknown material:

1. Visually inspect all drums that are being considered for sampling for the following:

    - pressurization (bulging/dimples);
    - crystals formed around the drum opening;
    - leaks, holes, stains;
    - labels, markings;
    - composition and type (steel/poly and open/bung);
    - condition, age, rust; and
    - sampling accessibility.

Drums showing evidence of pressurization and crystals should be furthered assessed to determine if remote drum opening is needed. If drums cannot be accessed for sampling, heavy equipment is usually necessary to stage drums for the sampling activities. Adequate time should be allowed for the drum contents to stabilize after a drum is handled.

2. Identify each drum that will be opened (e.g., paint sticks, spray paint, cones, etc).

NOTE: LEVEL "B" PROTECTION IS REQUIRED FOR THE FOLLOWING STEPS:

3. Before opening, ground each metal drum that is not in direct contact with the earth using grounding wires, alligator clips and a grounding rod or metal structure. If a metal drum is in an over-pack drum, the metal drum should be grounded.

4. Touch the drum opening equipment to the bung or lid and allow an electrical conductive path to form. Slowly remove the bung or drum ring and/or lid with spark resistant tools (brass/beryllium).

5. Screen drums for explosive gases and toxic vapor with air monitoring instruments as bung or drum lid is removed. Depending on site conditions, screen for one or more of the following:

   - radioactivity;
   - cyanide fumes;
   - halogen vapors;
   - pH; and/or
   - flash point (requires small volume of sample for testing).

   Note the state, quantity, phases and color of the drum contents. Record all relevant results, observations and information in a logbook, Drum Data Form or Drum Data Table. Table 2 is an example of a Drum Data Table. Review the screening results with any pre-existing data to determine which drums will be sampled.

6. Select the appropriate sampling equipment based on the state of the material and the type of container. Sampling equipment should be made of non-reactive material.

7. Place oil wipe (as necessary), sampling equipment and sample containers near drum(s) to be sampled.

NOTE: AIR MONITORING FOR TOXIC VAPORS AND EXPLOSIVE GASES AND OXYGEN DEFICIENT ATMOSPHERES SHOULD BE CONDUCTED DURING DRUM SAMPLING

Liquids – COLIWASAs (COmposite LIquid WAste SAmplers) or drum thieves are used to collect liquid samples from drums. The COLIWASA or drum thief is slowly lowered

to the bottom of the container. Close the COLIWASA with the inner rod or create a vacuum with the sampler's gloved thumb on the end of the thief and slowly remove the sampling device from the drum. Release the full contents from the device into one sample container. Repeat the procedure until a sufficient sample volume is obtained.

Solids/Semi-Solids – Use a push tube, bucket auger or screw auger or if conditions permit a pneumatic hammer/drill to obtain the sample. Carefully use a clean stainless steel spoon to place the sample into container(s) for analyses.

Close the drums when sampling is complete. Segregate contaminated sampling equipment and investigative derived wastes (IDW) containing incompatible materials as determined by the drum screening procedure (Step #5). At a minimum, contaminated, non-disposable equipment should be cleaned with laboratory detergent and rinsed with tap water prior to returning it from the field. IDW should be managed according to the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202) and Region 4's *Contaminated Media Policy*.

4.4 Tanks

Sampling tanks is considered hazardous due to the potential for them to contain large volumes of hazardous materials and therefore, appropriate safety protocols must be followed. Unlike drums, tanks may be compartmentalized or have complex designs. Preliminary information about the tank's contents and configuration should be reviewed prior to the sampling operation to ensure the safety of sampling personnel and that the study's objectives can be achieved.

In addition to having discharge valves near the bottom of tanks and bulk storage units, most tanks have hatches at the top. It is desirable to collect samples from the top hatch because of the potential for the tank's contents to be stratified. Because wastes often stratify due to different densities of phases or settling of solids, it may be important to obtain a vertical cross section of the entire unit, or it may be desirable to collect grab samples from each strata. Additionally, when sampling from the discharge valve, there is a possibility of a stuck or broken valve which could cause an uncontrolled release. Investigators should not utilize valves on tanks or bulk storage devices unless they are operated by the owner or operator of the facility, or a containment plan is in place should the valve stick or break. If the investigator must sample from a tank discharge valve, the valving arrangement of the particular tank must be clearly understood to ensure that the compartment(s) of interest is sampled.

Because of the many different types of designs and materials that may be encountered, only general sampling procedures that outline sampling a tank from the top hatch are listed below:

1. All relevant information concerning the tank such as the type of tank, the tank capacity, markings, condition and suspected contents should be documented in a logbook.

2. The samplers should inspect the ladder, stairs and catwalk that will be used to access the top hatch to ensure that they will support the samplers and their equipment.

3. Before opening, ground each metal tank using grounding wires, alligator clips and a grounding rod or metal structure.

NOTE: LEVEL "B" PROTECTION IS REQUIRED FOR THE FOLLOWING STEPS:

4. Any vents or pressure release valves should be slowly opened to allow the unit to vent to atmospheric pressure. Air monitoring for explosive/flammable gases and toxic vapors should be conducted during the venting with the results recorded in a logbook. If dangerous concentrations of gases evolve from the vent or the pressure is too great, leave the area immediately.

5. Touch tank opening equipment to the bolts in the hatch lid and allow electrical conductive path to form. Slowly remove bolts and/or hatch with spark resistant tools (brass/beryllium). If a pressure build up is encountered or detected, cease opening activities and leave the area.

6. Screen tanks for explosive/flammable gases and toxic vapors with air monitoring instruments. Depending on the study objectives and site conditions, conduct characteristic screening (e.g., pH, halogen, etc.) as desired. Collect a small volume of sample for flash point testing, if warranted. Note the state, quantity, number of phases and color of the tank contents. Record all relevant results, observations, and information in a logbook. Compare the screening results with any pre-existing data to determine if the tank should be sampled.

7. Select the appropriate sampling equipment based on the state of the material and the type of tank. Sampling equipment should be constructed of non-reactive materials.

8. Place oil wipe (as necessary), sampling equipment and sample containers near tanks(s) to be sampled.

NOTE: AIR MONITORING FOR TOXIC VAPORS AND EXPLOSIVE GASES AND OXYGEN DEFICIENT ATMOSPHERES SHOULD BE CONDUCTED DURING DRUM SAMPLING

Liquids -- Slowly lower the bailer, bacon bomb, Dipstick™, COLIWASA, or Teflon® tubing to the desired sampling depth. *(NOTE: In work areas where explosive/flammable atmospheres could occur, peristaltic pumps powered by 12 V batteries should not be used.)* Close the sampling device or create a vacuum and slowly remove the sampling device from the tank. Release the sample from the device into the sample container. Repeat the procedure until a sufficient sample volume is obtained.

Solids/Semi-Solids - Use a push tube, bucket auger, screw auger, Mucksucker™, or if conditions permit a pneumatic hammer/drill to obtain the sample. Carefully extrude the sample from the sampling device or use a clean stainless steel spoon to place the sample into containers for analyses.

9. Close the tank when sampling is complete. Segregate contaminated sampling equipment and investigative derived wastes (IDW) containing incompatible materials as determined by the screening procedure (Step #6). At a minimum, contaminated, non-disposable equipment should be cleaned with laboratory detergent and rinsed with tap water prior to returning it from the field. IDW should be managed according to the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202) and Region 4's *Contaminated Media Policy*.

4.5 Miscellaneous Contaminated Materials

Sampling may be required of materials or equipment (e.g., documents, building materials, equipment, etc.) to determine whether or not various surfaces are contaminated by hazardous constituents, or to evaluate the effectiveness of decontamination procedures.

Wipe or swab samples may be taken on non-absorbent, smooth surfaces such as metal, glass, plastic, etc. The methodology for wipe sampling is found in the SESD Operating Procedure for Wipe (Contaminated Surface) Sampling (SESDPROC-304). All surfaces and areas selected for sampling should be based on the study's objectives.

For items with porous surfaces such as documents (usually business records), insulation, wood, etc., actual samples of the materials are required. It is therefore important that during the collection and/or analyses of the sample that evidentiary material is not destroyed. Use scissors or other particle reduction devices that have been cleaned as specified in the SESD Operating Procedures for Field Equipment Cleaning and Decontamination (SESDPROC-205) or the SESD Operating Procedures for Field Equipment Cleaning and Decontamination at the FEC (SESDPROC-206) to cut/shred the sample. Mix in a glass pan as specified in the SESD Operating Procedure for Soil Sampling (SESDPROC-300). The shredded, homogenized material is then placed in sample containers.

5 Waste Sample Handling Procedures

5.1 General

When collecting samples of concentrated wastes for laboratory analyses, field personnel are required to screen the waste materials to ensure safe handling and transportation of the samples. Safety procedures, sampling and screening methods used to collect the samples must comply with those procedures/methods described in this protocol. It should be noted that waste samples should not be preserved because of the potential for an inadvertent chemical reaction with the preservative. Additionally, concentrated waste samples are not required to be cooled to 4°C.

After samples have been collected and containerized, the outside of the sample containers should be cleaned with water, paper towels and/or oil wipes to remove any spilled material from the exterior of the container. It should be noted that each sample container should be labeled in accordance with SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005 (Most Recent Version) and placed in a plastic bag. The bag should be securely closed. Samples collected from materials that did not demonstrate any hazardous properties during the screening process nor have strong chemical odors may be placed in coolers and handled as non-hazardous samples in accordance with the SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209 (Most Recent Version).

Field investigators will use knowledge gained of site practices and processes, labels and marking on waste containers, field screening results and personal observations made during their investigation to determine the hazard potential of a sample. Samples considered to be hazardous by the field investigators or detected to have strong chemical odors will be placed in secondary containment for transport to the SESD laboratory and for subsequent handling upon arrival. The bagged samples will be placed in a plastic pail and sealed with a tight fitting lid. The project number for the sampling investigation and the specific sample station number will be marked on the secondary container in indelible ink. A standard SESD Hazard Communication Label will be affixed to the side of the secondary container. The appropriate hazard(s) for the sample (Health, Flammability, and/or Reactivity) will be indicated with an "X." Additionally, an "X" will be placed in the "Protective Equipment" section of the label if protective equipment was required for collection of the sample.

All secondary containing pails will be secured in the vehicles while transporting the samples from the field to the laboratory for analyses. In addition, each pail should indicate when protective equipment is recommended to handle the actual waste sample material.

6 Particle Size Reduction

6.1 General

Particle size reduction of waste samples is periodically required in order to complete an analytical scan or the Toxicity Characteristic Leaching Procedure (TCLP) test. Samples that may require particle size reduction include slag, bricks, glass/mirror cullet, wire, etc. Method 1311 (TCLP) states "Particle size reduction is required, unless the solid has a surface area per gram of material equal to or greater than 3.1 cm^2, or is smaller than 1 cm in its narrowest dimension (i.e., capable of passing through a 9.5 mm (0.375 inch) standard sieve). If the surface area is smaller or the particle size larger than described above, prepare the solid portion of the waste for extraction by crushing, cutting or grinding the waste to a surface area or particle size as described above" (55 FR 26990). The method also states that the surface criteria are meant for filamentous (paper, cloth, etc.) waste materials, and that "Actual measurement of the surface area is not required, nor is it recommended." Also, the loss of volatile organic compounds could be significant during particle size reduction.

Waste samples that require particle size reduction are often too large for standard sample containers. If this is the case, the sample should be secured in a clean plastic bag and processed using normal chain-of-custody procedures (SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005 (Most Recent Version)). Note that the sample labels or tags that will be required for the various containers should be prepared in the field and either inserted into or attached to the sample bag.

Because of the difficulty in conducting particle size reduction, it may be completed at SESD's Field Equipment Center (FEC). The following procedure may be used for crushing and/or grinding a solid sample:

1. Remove the entire sample, including any fines that are contained in the plastic bag and place them on the standard cleaned stainless steel pan or cover the sample material with clean plastic.

2. Using a clean hammer, carefully crush or grind the solid material (safety glasses are required), attempting to minimize the loss of any material from the pan. Some materials may require vigorous striking by the hammer, followed by crushing or grinding. The material may be subject to crushing/grinding rather than striking.

3. Continue crushing/grinding the solid material until the sample size approximates 0.375 inch. Attempt to minimize the creation of fines that are significantly smaller than 0.375 inch in diameter.

4. Pass the material through a clean 0.375-inch sieve into a glass pan.

5. Continue this process until sufficient sample is obtained. Thoroughly mix the sample as described in the SESD Operating Procedure for Soil Sampling (SESDPROC-300). Transfer the contents of the glass pan into the appropriate containers.

6. Attach the previously prepared labels/tags and submit for analyses.

Table 1

SAMPLING EQUIPMENT FOR VARIOUS WASTE UNITS

Equipment	Waste Units/Phases	Limitations
Scoop with bracket/conduit	Impoundments, piles, containers, tanks/liquids, solids, sludges	Can be difficult to collect deeper phases in multiphase wastes. Depth constraints.
Spoon	Impoundments, piles, containers/solids, sludges	Similar limitations as the scoop. Generally not effective in sampling liquids.
Push tube	Piles, containers/cohesive solids, sludges	Should not be used to sample solids with dimensions >½ the diameter of the tube. Depth constraints.
Auger	Impoundments, piles, containers/solids	Can be difficult to use in an impoundment or a container, or for solidified wastes.
Sediment sampler	impoundments, piles/solids, sludges	Should not be used to sample solids with dimensions >½ the diameter of the tube.
Ponar dredge	Impoundments/solids, sludges	Must have means to position equipment to desired sampling location. Difficult to decon.
COLIWASA or drum thief	Impoundments, containers, tanks/liquids	Not good with viscous wastes. Devices ≥ 7' require 2 samplers to use effectively.
Dipstick™ / Mucksucker™	Impoundments, containers, tanks/liquids, sludges	Not recommended for tanks >11 feet deep. Devices ≥ 7' require 2 samplers to use effectively.
Bacon bomb	Impoundments, tanks/liquids	Not good with viscous wastes.
Bailer	Impoundments, tanks/liquids	Only if waste is homogeneous. Not good with viscous wastes.
Peristaltic pump with vacuum jug assembly	Impoundments, tanks/liquids	Cannot be used in flammable atmospheres. Not good with viscous wastes.
Back-hoe bucket	Piles/solids, sludges	May be difficult to access desired sampling location. Difficult to decon. Can lose volatiles.
Split-spoon	Piles/solids	Requires drill rig or direct push equipment.
Roto-hammer	Piles, containers/solids	Physically breaks up sample. May release volatiles. Not for flammable atmospheres.

Table 2

DRUM DATA TABLE

DATES:_____ **PAGE** _____**of** _____

SESD PROJECT ID NO._____ **SITE NAME:**_____

CITY:_____ **STATE:**_____

SESD Drum No.	Markings	Drum Size	Drum Type	Drum Condition	Drum Opening Team	Volume	Drum Contents Description Phase Color	Air Monitoring FID-PID / CGI / pH	Fl. Point / Hal.	Sample Collected	Sampler / Time
		55 /	S / P / ___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				

APPENDIX D. STORM WATER POLLUTION PREVENTION PLAN

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Final

Storm Water Pollution Prevention Plan
UXO 1 (SWMU 77) Soil Removal
NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PR

May 2015

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Contract Number N62470-12-D-7016, CTO JM01

Final

Storm Water Pollution Prevention Plan

UXO 1 (SWMU 77) Soil Removal

NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PR

May 2015

Prepared for:

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Prepared by:

USA Environmental, Inc.
Cape Environmental Management, Inc.
Right Way Environmental Contractors, Inc.

Prepared Under:

Contract Number N62470-12-D-7016, CTO JM01

Storm Water Pollution Prevention Plan

UXO 1 (SWMU 77) Soil Removal

Naval Activity Puerto Rico (NAPR), Ceiba, PR

May 2015

I hereby certify that the enclosed Storm Water Pollution Prevention Plan, shown and marked in this submittal, is that proposed to be incorporated with Contract Number N62470-12-D-7016, Contract Task Order JM01, *"Multiple Awards Indefinite Delivery Indefinite Quantity (IDIQ) Range Sustainment, Military Munitions Response; Environmental Compliance & Remediation Services Contracts Scope of Work for UXO 1 (SWMU 77) Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, PR."* This Storm Water Pollution Prevention Plan is in compliance with contract specifications and is submitted for Government approval.

Reviewed By:

05/20/2015

Project Manager — Date

5/20/2015

Quality Control Manager — Date

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ACRONYMS AND ABBREVIATIONS

%	Percent
bgs	Below Ground Surface
BMP	Best Management Practices
BRAC	Base Realignment and Closure
CASQA	California Stormwater Quality Association BMP Handbook
CGP	Construction General Permit
COC	Chain of Custody
CSMP	Construction Site Monitoring Program
CTO	Contract Task Order
CY	Cubic Yards
EPA	Environmental Protection Agency, United States
LRP	Legally Responsible Person
MS4	Municipal Separate Storm Sewer System
NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
NOI	Notice of Intent
NOT	Notice of Termination
NSRR	Naval Station Roosevelt Roads
NTR	Navy Technical Representative
OB/OD	Open burn/Open detonation
PM	Project Manager
PR	Puerto Rico
PRD	Permit Required Documents
PREQB	Puerto Rico Environmental Quality Board
QA	Quality Assurance
QC	Quality Control
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RFP	Request for Proposal
RPM	Remedial Project Manager
RSL	Regional Screening Level
RUSLE	Revised Universal Soil Loss Equation
SE	South East
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan

SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
U.S.	United States
USA	USA Environmental, Inc.
USA Team	USA Environmental, Inc. and subcontractors Cape Environmental Management Inc. and Right Way Environmental Contractors Inc.
UXO	Unexploded Ordnance
WMP	Waste Management Plan
WP	Work Plan
WPCD	Water Pollution Control Drawing

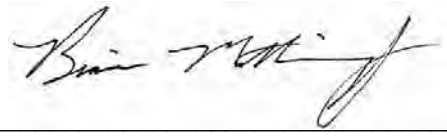
1.0 SWPP CERTIFICATION

1.1 SWPPP CERTIFICATION BY PROGRAM MANAGER

Project Name: RCRA Interim Corrective Measure Soil Removal UXO 1 (SWMU 77), Naval Activity Puerto Rico (NAPR), Ceiba, PR

Project Number:

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 ensure 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 gather the information, to the best of my knowledge and belief; the information submitted is 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.



5/20/2015

Brian Mattingly
Senior Project Manager

Date

1.2 OWNER APPROVAL AND CERTIFICATION OF SWPPP

OWNER APPROVAL AND CERTIFICATION OF SWPPP
Owner's (or Authorized Representative's)
Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name: RCRA Interim Corrective Measure Soil Removal UXO 1 (SWMU 77), Naval Activity Puerto Rico (NAPR), Ceiba, PR

Project Number:

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 ensure 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 gather the information, to the best of my knowledge and belief; the information submitted is 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.

_____ _____

Stacin Martin Date
Remedial Project Manager

2.0 SWPPP REQUIREMENTS

2.1 INTRODUCTION

The USA Team has prepared this Stormwater Pollution Prevention Plan (SWPPP) on behalf of the Department of the Navy, and the Naval Facilities Engineering Command South East (NAVFAC SE) for the implementation of a remedial action for soil at UXO 1 (SWMU 77) located at Naval Activity Puerto Rico (NAPR). UXO 1 is located on the peninsula at Punta Medio Mundo on the northeastern boundary of NAPR. UXO 1 covers approximately 66 acres and historically was used as a small arms range. UXO 1 consists of six subareas: the current Pistol Range Subarea, Former Pistol Range Subarea, Rifle Range Subarea, Potential Open Burn/Open Detonation (OB/OD) Subarea, Potential Munitions Trench Subarea, and the Detonation Area Near Concrete Pad Subarea. The interim corrective measure is for three of the six subareas: the Former Pistol Range Subarea, the Pistol Range Subarea, and the Rifle Range Subarea. The OB/OD Subarea and the Potential Munitions Trench Subarea were not included in the interim corrective measure because the Phase I RFI at these subareas were inconclusive and required more investigations at the time the interim corrective measure was contracted. For the Detonation Area Near Concrete Pad Subarea, there were no unacceptable human health risks and high uncertainty in the ecological risk estimates. For this Subarea, RCRA corrective action interim measures have been deferred until additional characterization as part of the supplemental RFI can be conducted. The interim corrective measure for the four subareas is excavation of impacted soil, on-site treatment, and disposal off-site at an approved facility.

In accordance with the contract statement of work, this SWPPP was prepared to comply with California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ (Order 2009-0009-DWQ) (Appendix A). Under the California General Permit, a Risk Level is determined following guidance given in the General Permit. The Risk Level determination is discussed in Section 3.3. The project site is considered to have a Risk Level 2. The SWPPP has been designed to address the following objectives:

- Pollutants and their sources are controlled, including sources of sediment associated with construction, construction site erosion and other activities associated with construction activity.
- Non-stormwater discharges have been identified and either eliminated, controlled, or treated.
- Site best management practices (BMPs) are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to best available technology/best control technology (BAT/BCT) standards.
- Calculations and design details as well as BMP controls for site run-on are complete and correct.
- Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.
- Identify and provide methods to implement BMP inspection, visual monitoring, and construction site monitoring program (CSMP) requirements to comply with the General Permit.

2.2 PERMIT REGISTRATION DOCUMENTS

To obtain coverage under Order 2009-0009-DWQ, project-related permit registration documents (PRDs) must be submitted to Puerto Rico under the EPA's Construction General Permit (CGP [permit number: PRR120000]).The PRDs must be submitted to EPA Region 2. To submit PRDs, NAPR's legally responsible person (LRP) or approved signatory must submit the PRDs or must assign a data entry person for the project to submit the PRDs. NAPR has assigned the Remedial Project Manager (RPM) as the LRP. The USA Team will work with the LRP to submit PRDs to PREQB.

The PRDs for UXO 1 are located in Appendix B and are listed below (Note, Appendix B will be completed once Navy approves draft SWPPP):

- Notice of Intent

- Site Map
- Signed Certification Statement

This SWPPP will also be submitted to the RPM as a PRD.

2.3 SWPPP AVAILABILITY AND IMPLEMENTATION

A copy of the SWPPP will be available at the construction site during working hours while construction is occurring and will be made available upon request by the RPM or EPA Region 2. The SWPPP will be implemented concurrently with the start of ground-disturbing activities.

2.4 SWPPP AMENDMENTS

This SWPPP shall be amended as follows:

- Whenever there is a change in construction or operations that may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4).
- If any condition of the General Permit is violated or the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved. If the PREQB determines that a permit violation has occurred, the SWPPP shall be amended and implemented within 14 calendar days after notification by the EPA Region 2.
- Annually, prior to the defined rainy season.
- When deemed necessary by the owner.

The following items will be included in each amendment:

- A listing of the date of initial preparation;
- Date of each amendment
- Who requested the amendment
- The location of proposed change
- The reason for change
- The original BMP proposed, if any
- The new BMP proposed

SWPPP amendments will be completed by and signed off by a Qualified SWPPP Developer (QSD). SWPPP amendments will be directly attached to the SWPPP and logged in SWPPP Appendix C.

2.5 RETENTION OF RECORDS

Hard-copy records will be maintained on-site for the duration of the UXO 1 project. Electronic copies will be maintained by the USA Team after closure of the project. Records will be retained for a minimum of three years for the following items:

- Site inspections
- Compliance certifications
- Discharge reports
- Annual Report
- Approved SWPPP document and amendments

Records listed above will be provided to NAPR's RPM. Record requests by the EPA Region 2 should be directed to the RPM.

2.6 REQUIRED NONCOMPLIANCE NOTICE

If a prohibited discharge occurs or if the project receives a written notice of noncompliance, the USA Team will immediately notify the RPM. Within 10 days, the USA Team will report the incident to EPA Region 2. The following types of reports must be submitted for a Risk Level 2 site:

- Self-reporting of any other discharge violation or to comply with a EPA Region 2 enforcement action; or
- Discharges that contain a hazardous substance in excess of the reportable quantities established in Title 40, Code of Federal Regulations Parts 117.3 and 302.4, unless a separate National Pollutant Discharge Elimination System (NPDES) permit has been issued to regulate those discharges.

2.7 ANNUAL REPORT

Order 2009-0009-DWQ requires dischargers to prepare, certify, and electronically submit an Annual Report no later than September 1 of each year. Because the project will be less than 1 year in length, only one annual report will be submitted by September 1, 2014. Reporting requirements are identified in Section XVI of Order 2009-0009-DWQ and include (but are not limited to) providing a summary of the following:

1. Sampling and analysis results including laboratory reports, analytical methods and reporting limits and chain-of-custody (COC) forms (CSMP reporting requirements are also listed in Section 8).
2. Corrective actions and compliance activities, including those not implemented.
3. Violations of the General Permit.
4. Date, time, place, and name(s) of the inspector(s) for all sampling, inspections, and field measurement activities.
5. Visual observation and sample collection exception records.
6. Training documentation of personnel responsible for General Permit compliance activities.

2.8 CHANGES TO PERMIT COVERAGE

Order 2009-0009-DWQ (Section II.C) allows a discharger to reduce or increase the total acreage covered under the General Permit when a portion of the project is complete and/or conditions for termination of coverage have been met, when ownership of a portion of the project is sold to a different entity, or when new acreage is added to the project.

To change the acreage covered, the discharger must electronically file modifications to PRDs. The modifications include revised NOI, site map, SWPPP revisions as appropriate, and a certification that new landowners have been notified of applicable requirements to obtain permit coverage. The certification statement will include name, address, phone number, and e-mail address of new landowner in accordance with the requirements of the General Permit. The submittal is required within 30 days of a reduction or increase in total disturbed area.

In the event changes are made, revised PRDs will be submitted to EPA Region 2 either by the RPM or by the USA Team, and SWPPP revisions will be documented in SWPPP Appendix C. The revised PRDs will be kept with the SWPPP document in Appendix D, “Submitted Changes to PRDs.”

2.9 NOTICE OF TERMINATION

The USA Team intends to terminate coverage after final stabilization. To terminate coverage under Order 2009-0009-DWQ, a Notice of Termination (NOT) must be completed. The EPA requires the NOT to be submitted electronically. A final site map and photographs are required to be submitted with the NOT. Filing a NOT certifies that Order 2009-0009-DWQ requirements have been met. The NOT is submitted

when the construction project is complete and within 90 days of meeting all General Permit requirements for termination and final stabilization (Section II.D) including:

- The site will not pose any additional sediment discharge risk than it did prior to construction activity.
- All construction –related equipment, materials, and any temporary BMPs no longer needed are removed from the site.
- Post-construction stormwater management measures are installed and a long-term maintenance plan that is designed for a minimum of five years has been developed.

The NOT must demonstrate through photos, Revised Universal Soil Loss Equation (RUSLE) results, or results of testing and analysis that the project meets all of the requirements of Section II.D.1 of Order 2009-0009-DWQ by one of the following methods:

- 70 percent (%) final cover method (no computational proof required); or
- RUSLE/RUSLE2 method (computational proof required); or
- Custom method (discharger demonstrates that site complies with final stabilization)

3.0 PROJECT INFORMATION

3.1 PROJECT AND SITE DESCRIPTION

Originally established in 1941 as Fort Bundy, the base was commissioned in 1943 as a Naval Operations Base and re-designated as Naval Station Roosevelt Roads (NSRR) in 1957. NSRR operated as a Naval Station until March 31, 2004, when NSRR underwent operational closure. Based on the ceasing of military operations, the name for NSRR was changed to NAPR on April 1, 2004. Currently, NAPR occupies more than 8,600 acres on the east coast of Puerto Rico, along Vieques Passage with Vieques Island lying approximately 10 miles to the east (Figu\re 1).

UXO 1 is located on the peninsula at Punta Medio Mundo on the northeastern boundary of Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico. S UXO 1 covers approximately 66 acres and historically was used as a small arms range. UXO 1 consists of six subareas: the current Pistol Range Subarea, Former Pistol Range Subarea, Rifle Range Subarea, Potential Open Burn/Open Detonation (OB/OD) Subarea, Potential Munitions Trench Subarea, and the Detonation Area Near Concrete Pad Subarea. Locations of each UXO 1 subarea are depicted Figure 2. The small arms range which consisted of the Rifle Range and Pistol Range subareas were closed on January 1, 2010. The interim corrective measure is for three of the six subareas: the Former Pistol Range Subarea, the Pistol Range Subarea, and the Rifle Range Subarea.

3.1.1 PROJECT DESCRIPTION

This SWPPP has been developed to cover the remediation of lead-contaminated soils at UXO 1 at NAPR. The portions of UXO 1 addressed in this SWPPP (including excavations only) encompass 4 acres of the 66-acre UXO 1 site. The excavation areas are anticipated to be relatively shallow (between 1.0 to 3.0 feet below ground surface [bgs]). Excavation at the Rifle Range Subarea also includes removing a 10 foot tall berm. Excavation will be accomplished using heavy earthmoving equipment as warranted to expedite the remedial effort. It is anticipated that some combination of dozers, excavators, loaders, off road trucks, or motor graders may be utilized to complete the proposed excavation. Grades will be confirmed manually as excavation progresses. A combination of construction fencing, warning signs, incidental backfill, or sloping will be used to maintain safe conditions near completed excavations. The USA Team will direct load soils from the four UXO 1 subareas and transporting the soils to one location for stabilization at the Rifle Range Subarea. Trucks will be directed to an appropriate off-site disposal facility permitted to receive the wastes. A nonhazardous waste manifest or bill of lading as appropriate will be completed as indicated in the Waste Management Plan for UXO 1(SWMU 77) Soil Removal, Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico.

3.1.2 SITE DESCRIPTION

According to the Phase I RFI, the topography within NAPR ranges from 0 to 131 feet above mean sea level. At UXO 1, the access road entrance area is low lying, but otherwise UXO 1 is hilly and vegetated except where areas have been cleared and leveled for operational purposes. Vegetative cover limits the amount of erosion that occurs at the site. No floodplains or significant surface water bodies including lakes, ponds, streams, or creeks are present within UXO 1. However, the site is a peninsula bordered by water on all sides except the west (TetraTech, 2011). Soil disturbing activities are located hundreds of feet away from the peninsula coast.

3.2 STORMWATER RUN-ON FROM OFF-SITE AREAS

The Order 2009-0009-DWQ (Section XIV.A.4) requires that the SWPPP address calculations and design details as well as BMP controls for site run-on. There are no anticipated locations for run-on in at the project area under the existing site conditions as described in Table 3-1.

Run-On		
Run-off Area Coefficient	=	0.42
Area Rainfall Intensity (2 years, 1 hours) (mm/hr)	=	46
Drainage Area (km2)	=	0.018
Site Area Run-On Discharge (m3/sec)	=	0.097

Table 3-1 Run-On Existing Site Conditions

There is the potential for the undisturbed areas or Lake Chamberlain Road to contribute flow to the excavation areas. Sand bags, silt fencing, and/or a clean, compacted berm will be installed to reduce the potential for flow from the undisturbed areas from entering the excavation areas. The excavation areas and the BMPs to prevent flow from entering the excavation areas are identified on the water pollution control drawing (WPCD) presented as Figure 3.

3.3 FINDINGS OF THE CONSTRUCTION SITE SEDIMENT AND RECEIVING WATER RISK DETERMINATION

The site sediment risk and receiving water risk were calculated based on the guidance provided in the General Permit.

3.3.1 SEDIMENT RISK DETERMINATION

The soil erodibility factor, K, was assessed using the RUSLE2 Report provided from the US Department of Agriculture (DA) Natural Resources Conservation Service Web Soil Survey for the Humacao Area of the Eastern Part of Puerto Rico. The K-factor for Descalabrado and Guayama soils is 0.24.

The rainfall erosivity factor, or R-factor, is based on the project location and duration. The duration (or period of construction) begins at the initial earth disturbance and ends with final stabilization. The initial disturbance will occur in June 2015. The USA Team intends to start stabilizing the site in the beginning of September 2015. The estimated date of final stabilization is September 2015. The EPA-NPDES Rainfall Erosivity Factor Calculator was under construction during the development of the SWPPP. An Isoerodent map of Puerto Rico was located in the Runoff Estimates for Small Rural Watersheds and Development of a Sound Design Method. Volume II, Recommendations for Preparing Design Manuals and Appendices B,C,D, E, F, G, and H by the Fletcher, Joel, et. al. According to the Isoerodent map of Puerto Rico, the project site has an R value of 680. No erosivity index zone map for Puerto Rico was available, so the maximum annual EI value (100%) was used to determine the site R-factor of 680.

The LS-factor combines the effects of the hillslope length factor, L, and a hillslope gradient, S. The LS-factor was determined using the RUSLE LS-table and contour map. The subarea with the steepest gradient is the Rifle Range Subarea which has an approximate gradient of 2.7% for a sheet flow length of approximately 280 feet. Therefore, those values (most conservative) were used in the RUSLE LS-table and the LS-factor is 0.69.

Multiplying the sediment risk factors together (0.24 x 680 x 0.69) = 113 tons/acre.

Based on the sediment risk calculation above, this site has a high sediment risk. Order 2009-0009-DWQ characterizes high sediment risk sites as those with greater than or equal to 75 tons/acre of sediment discharge potential.

3.3.2 RECEIVING WATER RISK DETERMINATION

The receiving water body, the Atlantic Ocean, is not sediment-impaired according to the EPA Watershed Assessment, Tracking and Environmental Results for Eastern Puerto Rico. Also there is not an EPA-

approved Total Maximum Daily Load (TMDL) Implementation Plan for sediment for any water body in Eastern Puerto Rico. The receiving water risk for the site is low.

3.3.3 RISK LEVEL DETERMINATION

Using the combined risk level matrix, the combined risk level for this project is Risk Level 2. Permit requirements for Risk Level 2 can be found in the General Permit, Attachment C. The General Permit is provided in Appendix A of this SWPPP.

3.3.4 CONSTRUCTION SCHEDULE

Mobilization for this project will begin in June 2015. The remediation phase of the project is scheduled to be conducted and completed between June and August 2015. Stabilization measures will be implemented after the remediation phase. Final stabilization is anticipated prior to September 2015. The project schedule is included in Appendix E. This schedule will be updated, as needed, throughout construction to reflect any major changes.

3.3.5 POTENTIAL CONSTRUCTION SITE POLLUTANTS SOURCES

Dischargers are required to conduct an assessment and create a list of potential pollutant sources and identify areas of the site where additional BMPs are necessary to reduce or prevent pollutants in discharges.

The following is a list of construction materials that will be used and activities that will be performed that will have the potential to contribute pollutants, other than sediment, to stormwater runoff (control practices for each activity are identified in Section 4):

- Vehicle use, storage, emergency maintenance, and fueling
- Equipment use, storage and maintenance
- Dust suppression
- Decontamination activities

Construction activities that have the potential to contribute sediment to stormwater discharges include excavation activities, stockpiling soil on-site for stabilization, and loading excavated soil for transport off site.

Locations of BMPs and control practices for the site are identified on the WPCD provided as Figure 3. Implementation and location of BMPs to be used during this project are listed by category in each of the following sections. The list of potential pollutant sources and areas of the site identified where BMPs will be implemented is included in Appendix F.

Because this SWPPP was prepared to comply with California's General Permit, copies of the California Stormwater Quality Association (CASQA) BMP Handbook fact sheets for the BMPs selected for this project are presented in Appendix G.

Prior to start of work, the work area will be surveyed for sensitive receptors (e.g., drains, location of residential receptors) so they can be protected.

The pollutants and potential pathways have been considered during the development of the BMPs in accordance with General Permit requirements.

3.3.6 IDENTIFICATION OF NON-STORMWATER DISCHARGES

Order 2009-0009-DWQ requires (Section XIV.A.2) that dischargers identify non-stormwater discharges and that discharges be eliminated, controlled, or treated. Section 4.3 describes the BMPs selected to control non-stormwater and prevent discharges from the potential sources listed below.

- Water used for dust suppression

- Water used at the decontamination pads
- Sanitary wastes from portable toilets
- Vehicle/equipment fluids

4.0 BEST MANAGEMENT PRACTICES

4.1 SCHEDULE FOR BMP IMPLEMENTATION

The anticipated schedule for deployment of BMPs is included in the construction schedule

(Appendix E). Prior to disturbing soil, some BMPs will be installed to provide perimeter protection and to minimize the potential for runoff. These BMPs will include decontamination pads, tracking controls such as the stabilized construction exit, and silt fencing. The approximate locations for the BMPs are shown on Figure 3, the WPCD.

The primary BMP is to schedule soil removal during dry weather to prevent loose contaminated soils from being exposed during storm events. The remediation phase of the project is scheduled to be conducted and completed during summer and fall months (June through September 2015). The USA Team will begin to stabilize disturbed areas after the remediation phase. Stabilization will occur by hydroseeding or placement of sod. Prior to disturbing soil, the Qualified SWPPP Practitioner (QSP) will check the weather to assess whether rain is in the forecast. Construction activities with potential to disturb soil will be minimized prior to forecast storm events. It is anticipated that contaminated disturbed soil will be removed off-site prior to storm events. If there is a rain event while contaminated disturbed soil is still on-site, the stabilization area will enclosed with a berm and covered with 6-mil liners.

The UXO 1 project will involve excavating soil from four subareas at various depths from 1.0 feet to 3.0 feet bgs. Excavation at the Rifle Range Subarea also includes removing a 10 foot tall berm. To reduce the potential for sediment discharge, the excavation will be used to contain stormwater. After the soils have been removed to the estimated remedial excavation depth, a clean, compacted soil berm will be installed around the disturbed area to contain the stormwater within the excavation. Sand bags or similar materials will be installed to reduce of the potential for run-on into the excavation areas.

The USA Team intends to have final stabilization and regulatory closure by September 2015. It is anticipated that the NOT will be submitted as described in the Section 2.9 by September 2015.

4.2 EROSION AND SEDIMENT CONTROLS

This SWPPP was developed to meet the requirements of the Risk Level 2 ranking under Order 2009-0009-DWQ. The applicable BMPs required under Risk Level 2 are identified in the sections below. In addition, Risk Level 2 dischargers shall minimize or prevent pollutants in stormwater discharges and authorized nonstormwater discharges through the use of controls, structures, and management practices that achieve BAT for toxic and nonconventional pollutants and BCT for conventional pollutants. The BMPs to meet these standards are described below.

Order 2009-0009-DWQ requires that SWPPPs be designed to address stabilization BMPs installed to reduce or eliminate pollutants after construction (Section XIV.A.5). Restoration standards have been included in the overall design plans for each UXO 1 subarea.

4.2.1 EROSION CONTROL

Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles.

The following items are required erosion control measures for a Risk Level 2 discharger (see Order 2009-0009-DWQ, Attachment C):

- Dischargers shall provide effective soil cover for inactive areas and all finished slopes, open space, utility backfill, and completed lots. Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be redisturbed for at least 14 days.

- Dischargers shall effectively manage all run-on, all runoff within the site, and all runoff that discharges off the site. Run-on from off the site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitation in this General Permit.
- Dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

The following CASQA BMP Handbook fact sheets are included to provide guidance on erosion controls used on the project:

- EC-1, “Scheduling”
- EC-2, “Preservation of Existing Vegetation”
- EC-4, “Hydroseeding”
- EC-9, “Earth Dikes and Drainage Swales”

4.2.2 WIND EROSION CONTROLS

Risk Level 2 dischargers shall implement effective wind erosion control in accordance with Order 2009-0009-DWQ, Attachment C. CASQA BMP Handbook Fact Sheet WE-1, “Wind Erosion Control,” has been included to provide guidance on wind erosion controls used on the project.

Potable water will be applied to disturbed soil areas of the project site to control dust. The water will be applied using two water trucks. A water tank has been installed at the northwest end of the project site to facilitate filling of water trucks. Water application rates will be minimized, as necessary, to prevent runoff and ponding. Leaks from water equipment will be repaired as soon as practicable.

Air monitoring for dust will occur adjacent to each subarea work site, as well as at an upwind sampling location. An air monitoring program will ensure that the dust abatement and suppression methods are sufficient. A direct reading particulate air monitor will be used on-site during all excavation operations. Two or three monitors will be set up as needed at the project fence line (downwind and upwind) during excavation or other earthmoving activities. The monitors will provide instantaneous data on total particulate concentrations. A data logger will record particulate concentrations averaged over one-minute intervals. The data collected will be downloaded daily. Dust particles, aerosols, and gaseous byproducts from construction activities shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. Additional information regarding dust control and management is included in the Site-Specific Safety and Health Plan (SSHP) (CAPE 2013b).

In addition to the air monitoring described above, the qualified SWPPP practitioner (QSP) will conduct routine visual observations at the perimeter of the site to assess if there are visible dust emissions.

4.2.3 SEDIMENT CONTROL

Sediment controls are structural measures that are intended to complement and enhance the selected erosion control measures and reduce sediment discharge from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.

Sufficient quantities of temporary sediment control materials will be maintained on-site throughout the duration of the project to allow implementation of temporary sediment controls in the event of predicted rain, and for rapid response to failures or emergencies, in conformance with other General Permit requirements and as described in this SWPPP. This includes implementation requirements for active and inactive areas before the onset of rain.

The following items are required sediment control measures for Risk Level 2 dischargers (see Order 2009-0009-DWQ, Attachment C):

- Dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.
- On sites where sediment basins are to be used, Risk Level 2 discharges shall, at minimum, design sediment basins according to the method provided in CASQA's BMP Handbook: Construction.
- Dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active construction.
- Dischargers shall apply linear sediment controls along the toe of the slope, face of the slope and at the grade breaks of exposed slopes to comply with sheet flow lengths in accordance with Table 4-1.
- Dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.
- Dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire wash-off locations) are maintained and protected from activities that reduce their effectiveness.
- Dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

Slope Percentage	Sheet Flow Length Not To Exceed
0 – 25%	20 feet
25 – 50%	15 feet
Over 50%	10 feet

Table 4-1 Critical Slope/Sheet Flow Length Combinations

The following CASQA BMP Handbook fact sheets are included to provide guidance on sediment controls used on the project:

- SE-1, "Silt Fence"
- SE-7, "Street Sweeping and Vacuuming"
- SE-9, "Straw Bale Barrier"

SE-1: Silt fencing will be used for around the perimeter of the excavation with the exception of the truck traffic openings. A berm will be used in areas where truck traffic enters and leaves the excavation. The WPCD, Figure 3, indicates the areas where the silt fencing will be used. Silt fencing will be maintained as recommended in SE-1 fact sheet.

SE-7: Street sweeping and vacuuming will be conducted by a vacuum sweeper as necessary to mitigate potential track out during hauling operations. Street sweeping will be conducted on Lake Chamberlain Road near the exit from the site.

SE-9: Straw bale barriers will be used to reinforce potential overflow points of the berm. A combination of sandbags and/or hay bales will be installed at the potential outlet points or spillways in the berm.

4.2.4 TRACKING CONTROLS

The following items are required sediment control measures for Risk Level 2 dischargers (see Order 2009-0009-DWQ, Attachment C):

- Dischargers shall stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

The following BMPs have been selected to reduce sediment tracking from the construction-site onto private or public roads:

- TC-1, “Stabilized Construction Entrance and Exit”
- TC-3, “Outlet Tire Wash”

TC-1: The exit at Lake Chamberlain Road will be stabilized, as described in TC-1, to reduce tracking of sediment as a result of construction traffic. The stabilized exit will be designed and graded to prevent runoff from leaving the site. The exit will be flared to provide an adequate turning radius. The exit will contain shaker plates and will be stabilized with 3- to 6-inch-diameter aggregate. Vehicles (including haul trucks, field trucks, and delivery vehicles) will enter and exit UXO 1 using the Lake Chamberlain Road entrance.

TC-3: Decontamination pads, located near each subarea, will be used to clean haul truck tires and undercarriages to reduce the potential of sediment transport onto public roadways. When conditions permit, dry decontamination will be considered and, if used, would be accomplished by brushing soils from truck tires. In wet or muddy conditions, pressure spray washers will be employed. The truck hauling route will be coordinated with NAPR. The truck route, stabilized entrances/exits, and decontamination pad are identified on Figure 3. Wash water and debris from the tire wash/decontamination area will be managed as described in Section 4.3, “Non-stormwater and Materials Management.”

Visible roadway dust will be minimized using stabilized entrance and exits and decontamination pads for washing truck tires and under carriages as described above. In addition, haul trucks will install secured tarps or cargo covering prior to exiting the site.

4.3 NON-STORMWATER AND MATERIALS MANAGEMENT

Risk Level 2 dischargers are required to implement good site management, waste management, vehicle storage and maintenance measures, and nonstormwater controls for construction materials that could potentially be a threat to water quality, if discharged.

The following items are the minimum BMP requirements for Risk Level 2 dischargers (see Order 2009-0009-DWQ Attachment C):

- Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e., poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
    - Note: The UXO 1 subarea remediation project will involve excavating lead-contaminated soils. Soils will be stabilized on site and then hauled away by truck and delivered to disposal facilities licensed to receive the waste. Approximately 10,057 bank cubic yards of soil will be removed from UXO 1. Other end products are not anticipated.
- Cover and berm loose stockpiled construction materials that are not actively being used (i.e., soil, spoils, aggregate, fly ash, stucco, hydrated lime, etc.).
- Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
- Minimize exposure of construction materials to precipitation.
- Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.
- Prevent disposal of rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

- Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the stormwater drainage system or receiving water.
- Clean or replace sanitation facilities and inspect them regularly for leaks and spills.
- Cover waste disposal containers at the end of every business day and during a rain event.
- Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water.
- Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.
- Implement procedures that effectively address hazardous and non-hazardous spills.
- Develop a spill response and implementation element of the SWPPP prior to the commencement of construction activities.
    - Equipment and materials for cleanup of spills shall be available on-site and spills and leaks shall be cleaned up immediately and disposed of properly.
    - Appropriate spill response personnel shall be assigned and trained.
- Ensure the containment washout areas that may contain additional pollutant there is no discharge into the underlying soil and onto the surrounding areas.
- Prevent oil, grease, or fuel to leak into the ground, storm drains, or surface waters.
- Place all equipment or vehicles, which are to be fueled, maintained, and store designated area fitted with appropriate BMPs.
- Clean leaks immediately and dispose of leaked materials properly.

The following CASQA BMP Handbook fact sheets are included to provide guidance on good site management, waste management and materials pollution control, and vehicle storage and maintenance used on the project:

- WM-1, “Material Delivery and Storage”
- WM-2, “Material Use”
- WM-3, “Stockpile Management”
- WM-4, “Spill Prevention and Control”
- WM-5, “Solid Waste Management”
- WM-7, “Contaminated Soil Management”
- WM-10, “Liquid Waste Management”
- NS-1, “Water Conservation Practices”
- NS-6, “Illicit Connection and Illegal Discharge Detection and Reporting”
- NS-8, “Vehicle and Equipment Cleaning”
- NS-9, “Vehicle and Equipment Fueling”
- NS-10, “Vehicle and Equipment Maintenance”

WM-1 and 2: Materials delivered to the site include petroleum product such as fuel, oil, and grease, all of which are typically used soon after delivery. In the event fuel or other hazardous materials are stored on-site, the materials will have secondary containment and regular inspections will be conducted on the designated area. Employees and subcontractors have been trained on the proper storage, handling, and use of these materials.

WM-3: Soils will be temporarily staged during the stabilization process. Soils will be staged within the Rifle Range Subarea. The 50 ft. by 90 ft. stabilization area will be bermed to prevent storm water runoff from entering the area. The floor will be covered with 30-mil HDPE liner, and the staged material will be covered using 6-mil liners. Excavated soils will be hauled to the stabilization area using 24 CY articulated trucks. The trucks will be unloaded onto the lined area where the stabilization agent is applied. Soils will be mixed with the designed stabilizing agent using the excavators and the dozer. At the conclusion of the project, the stabilization area will be over excavated to a depth of 3 inches, and the excavated soil will be treated with the stabilization agent prior to disposal within the excavation prior to hauling.

WM-4: Project personnel will adhere to the Spill Control Plan presented in the RCRA Interim Corrective Measure Work Plan, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico (NAPR), Ceiba, PR. Employees and subcontractors will be trained on the procedures listed in this plan and a copy of the plan will be posted on site.

WM-5: Trash containers will be available to collect solid waste generated at the site. Waste containers will be closed at the end of the business day and prior to and during rain events.

WM-7: Refer to WM-3. Supplies such as plastic sheeting and sand bags will be available to cover the staged soil.

NS-1: Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and transport of pollutants off site. The site-specific water conservation practices will include keeping water equipment in good working condition, repairing water leaks promptly, and using dust suppression water in accordance with the guidelines in WE-1 to reduce the potential for non-stormwater discharges.

NS-6: Project personnel have been trained to recognize illicit connections or illegally dumped or discharged materials.

NS-8: Decontamination pads, located near each subarea, will be used to clean haul truck tires and undercarriages to reduce the potential of sediment transport onto public roadways. When conditions permit, dry decontamination will be considered and, if used, would be accomplished by brushing soils from truck tires. In wet or muddy conditions, pressure spray washers will be employed. The truck hauling route will be coordinated with NAPR. The truck route, stabilized entrances/exits, and decontamination pad are identified on Figure 3. The decontamination pads will be used to clean vehicles, haul trucks, and equipment exiting the exclusion zone. The decontamination pad will be located away from the earthen channels and discharge points, will be bermed to contain wash water and prevent run-on, and will be configured with a sump to allow collection of the wash water for disposal. Decontamination water will be collected and stored in a tank pending sampling prior to disposition. If analytical results indicate that lead concentrations in the water are within regulatory screening levels, the wash water will be used for dust control practices following approval from NAPR. Wash water will not be discharged off site.

NS-9: Temporary fueling areas will be designated at the project site near the decontamination zones (Figure 3). The temporary fueling area will be away from the earthen channels and discharge points. Fuel trucks will be located at the site during fueling activities and will be moved off-site overnight. Fuel trucks will be equipped with absorbent spill cleanup materials.

In the event of a small spill, project personnel will adhere to the Spill Control Plan presented in the RCRA Interim Corrective Measure Work Plan, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico (NAPR), Ceiba, PR.

NS-10: Several types of vehicles and equipment may be used on-site throughout the project. These include excavators, loaders, trucks, and traffic control equipment. The equipment will be maintained off-site, when feasible. In the event equipment is maintained on-site, spill kits will be available to clean up leaks or spills. Maintenance activities will be located away from the earthen drainage channel and discharge points. Waste liquids generated during maintenance activities will be removed from the excavation site the day generated and will be stored and disposed of in accordance with the federal, state, local, and base regulations.

4.4 POST-CONSTRUCTION STORMWATER MANAGEMENT MEASURES

After the excavation of impacted soil, the USA Team intends to grade and stabilize the site. Stabilization will occur by hydroseeding or placement of sod. The USA Team intends to complete final stabilization on or before September 2015. The temporary BMPs described in this SWPPP will be removed at the conclusion of the project or maintained by NAPR.

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5.0 BMP INSPECTION, MAINTENANCE, AND RAIN EVENT ACTION PLANS

5.1 BMP INSPECTION AND MAINTENANCE

Inspections, maintenance, and repair of the UXO 1 remediation BMPs will be performed or supervised by the QSP. Inspections will be conducted as follows:

- Weekly
- Prior to a forecasted storm events (i.e. up to 48 hours prior)
- At 24-hour intervals during extended storm events
- After any qualifying rain event (0.5 inches or more)
- At any other time(s) or intervals of time specified in the contract documents

Blank and completed inspection Construction Site Inspection Report forms are included in Appendix H. The inspection form includes:

- Weather information, including the presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of the event, time elapsed since the last storm, and approximate amount of rainfall in inches
- Site information, including stage of construction, activities completed, and approximate area of the site exposed
- A description of BMPs evaluated and deficiencies noted
- A list of observations at erosion and sediment controls, chemical and waste controls, and non-stormwater controls for BMPs
- Results of visual inspections at outfalls, discharge points, downstream locations
- Reporting of the presence of noticeable odors or of visible sheen on the surface of discharges
- Photographs taken during the inspection
- Inspector's name, title, and signature

Appendix I contains a summary of the maintenance, inspection, and repair requirements for the BMPs within UXO 1 to assist the QSP.

In the event SWPPP amendments are required based on the inspection, a QSD will prepare the amendment and corrective actions will be implemented within 72 hours of the noted deficiency.

5.2 RAIN EVENT ACTION PLAN

Risk Level 2 dischargers are required to implement a Rain Event Action Plan (REAP). Elements of Rain Event Action Plan are described below.

- The discharger shall ensure a QSP develop a REAP 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The discharger shall ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (http://www.srh.noaa.gov/forecast).
- The discharger shall ensure a QSP develop the REAPs for all phases of contractions (i.e. Grading and Land Development, Excavation, Site Restoration).
- The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

  - Site Address
  - Calculated Risk Level (2 or 3)
  - Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
  - Erosion and Sediment Control Provider information including the name, company, and 34-hour emergency telephone number
  - Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number
- The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:
  - Activities associated with each construction phase
  - Trades active on the construction site during each construction phase
  - Trade contractor information
  - Suggested actions for each project phase
- The discharger shall ensure a QSP develop additional REAPs for the project site where construction activities are indefinitely halted or postponed (inactive construction). At a minimum, Inactive Construction REAPs must include:
  - Site Address
  - Calculated Risk Level (2 or 3)
  - Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
  - Erosion and Sediment Control Provider information including the name, company, and 34-hour emergency telephone number
  - Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number
  - Trades active on the construction site during each construction phase
  - Trade contractor information
  - Suggested actions for inactive construction sites
- The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.
- The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

6.0 TRAINING

This SWPPP has been developed by a QSD and will be implemented by a QSP. The QSP may delegate tasks to trained employees provided adequate supervision and oversight is provided.

An employee training program will be developed and implemented to educate employees about the requirements of the SWPPP prior to the start of construction. This education program will include background on the components and goals of the SWPPP and hands on training in erosion controls, spill prevention and response, good housekeeping, proper material handling, disposal and control of waste, equipment fueling and proper storage, washing, and inspection procedures. Additional training will be provided to key personnel on SWPPP implementation including the BMP inspection and maintenance and recordkeeping. Project personnel will be trained prior to working on the site. Training documentation will be provided to NAPR's RPM for submittal in the Annual Report. A training reporting form for this project is included in Appendix J. The completed training form will kept on-site in the SWPPP binder behind the blank Training Report form.

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7.0 RESPONSIBLE PARTIES AND OPERATORS

7.1 RESPONSIBLE PARTIES

Stacin Martin, the RPM, is the primary client and regulatory agency point of contact at NAPR for this project. Mr. Martin will be responsible for the submittal of General Permit regulatory documents such as the Annual Permit and PRDs.

Mr. Pedro Ruiz is the alternate contact at NAPR.

The QSP assigned for this project is: Mr. Francisco Martir Valentin

The QSP shall have primary responsibility and significant authority for the implementation, maintenance, and inspections described in the SWPPP. The QSP will be available throughout the duration of the project. Duties of the QSP include but are not limited to the following:

- Ensuring compliance with the SWPPP and the General Permit
- Implementing elements of the SWPPP, including but not limited to:
    - Implementation of prompt and effective erosion and sediment control measures
    - Implementing nonstormwater management materials and waste management activities such as monitoring discharges (if any); dewatering; diversion devices; general site cleanup; vehicle and equipment cleaning, fueling and maintenance; spill control; and ensuring that no materials other than stormwater are discharged in quantities that will have an adverse effect on receiving waters or storm drain systems
- Performing pre-storm inspections
- Conducting storm event inspections
- Performing post-storm inspections
- Making visual observations as specified in the Monitoring Plan
- Conducting routine inspections as specified in the project's specifications or described in the SWPPP
- Preparing annual compliance certification and/or Annual Report for the LRP
- Ensuring elimination of unauthorized discharges
- Mobilizing crews to make immediate repairs to the control measures
- Coordinating to assure all necessary corrections and repairs are made immediately, and that the project complies with the SWPPP, the General Permit and approved plans at all times
- Submitting Notices of Discharge and reports of illicit connections or illegal discharges
- Overseeing maintenance practices identified in the BMPs and in the SWPPP
- Identifying any deficiencies in the SWPPP and correcting them
- Ensuring that changes in construction plans are addressed in the SWPPP
- Training construction personnel

The QSD assigned for this project is: Ms. Corinne Walker.

The QSD will assist with SWPPP amendments and provide support for implementing the SWPPP.

A list of key personnel and a brief description of their project experience is included in Table 7-1, which will be updated as necessary.

Project Role	Qualifications
QSP: Francisco Martir Valentin	PR Licensed Engineer
QSD: Corinne Walker	Engineer

Table 7-1 Key Staff for the Implementation of the SWPPP

7.2 CONTRACTOR LIST

A list of individuals involved in the construction project can be found on the training documents in Appendix J. The following key contractors will be working on the project.

- USA Environmental, Inc. provides Overall site management of the project as well as unexploded ordnance construction support.
- Right Way Environmental Contractors Inc. (Right Way) provides excavation, BMP installation, and BMP maintenance services. Right Way will also provide labor and equipment for the construction and operation of wet and dry decontamination stations and will manage truck hauling operations.
- Cape Environmental Management, Inc. (CAPE) will provide sampling and data management services and oversight for waste transport and disposal services. In addition, CAPE will assist with SWPPP amendments and provide support for implementing the SWPPP upon request from USA Environment.
- Waste Management (El Coqui Landfill) provides disposal facilities for stabilized soil.
- Fraticelli Trucking Company will be responsible for the transportation of stabilized soil.

8.0 CONSTRUCTION SITE MONITORING PROGRAM

8.1 PURPOSE OF THE CONSTRUCTION SITE MONITORING PROGRAM

The General Permit requires that construction projects develop and implement a site specific CSMP. The CSMP includes the monitoring procedures and instructions, location maps, forms, and checklists necessary to implement the visual and water quality monitoring required for the site. This CSMP has been developed to meet the specific requirements and objectives identified in Order 2009-0009-DWQ for Risk Level 2.

8.2 TYPES OF MONITORING REQUIRED BY THE ORDER 2009-0009-DWQ (RISK LEVEL 2)

The General Permit requires the following types of monitoring for Risk Level 2 dischargers:

Visual Inspections

- Quarterly non-stormwater inspections
- Pre-storm inspections for qualifying storm events and REAPs
- “During rain” inspections
- Post-stormwater inspections
- Weekly BMP inspections

Sampling and Analysis

- Stormwater Discharge sample collection

Sections 8.5 and 8.6 define when these visual inspections and sample and analysis requirements are applicable.

8.3 MONITORING LOCATIONS

Monitoring locations are determined following the implementation of erosion and sediment controls and prior to the initiation of excavations. The locations are incorporated into this SWPPP in a later draft and/or amendment as needed.

Dischargers are not required to conduct visual observations or sample during dangerous weather conditions such as flooding or electrical storms. If visual observations or sampling activities are not performed due to the safety exception, an explanation will be provided to the RPM. Dischargers that did not make visual observations are required to include an explanation in their SWPPPs in the Construction Site Inspection Report form and in the Annual Report documenting why the visual observations or inspections were not conducted.

8.4 VISUAL MONITORING (INSPECTIONS)

The visual monitoring requirements are described below.

8.4.1 QUARTERLY NON-STORMWATER INSPECTIONS

Visual observations will be conducted quarterly in each of the following periods: January through March, April through June, July through September, and October through December. Visual observations (inspections) will be conducted during daylight hours (sunrise to sunset). Non-stormwater inspections will be conducted using the Construction Site Inspection Report form in Appendix H. Inspections will document the presence or evidence of non-stormwater discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), source of the discharge, and date and time each drainage area was inspected. In the event of an unauthorized discharge, the QSP will document the response taken to eliminate the unauthorized non-stormwater discharge. If the discharge is authorized, the QSP will document the measures taken to prevent non-

stormwater discharges from contacting potential pollutants. Non-stormwater discharges are not anticipated for this project.

8.4.2 WEEKLY INSPECTIONS

The QSP will perform weekly inspections to visually observe the following:

- Stormwater drainage areas, to identify spills, leaks, or uncontrolled pollutant sources
- BMPs, to identify whether they have been properly implemented in accordance with the SWPPP
- Stormwater storage and containment areas, to detect leaks and ensure maintenance of adequate freeboard

Inspections will be documented using the Construction Site Inspection Report form. The form will document the following:

- Inspection date and date the inspection report was written (inspection reports will be written on the same day).
- Weather information, including the presence or absence of precipitation, time elapsed since last storm.
- Site information, including stage of construction, activities completed, and approximate area of the site exposed.
- A description of BMPs evaluated and deficiencies noted.
- If safely accessible, a listing of the observations of BMPs: erosion controls, sediment controls, chemical and waste controls, and nonstormwater controls. The site checklist (page 3 of the Construction Site Inspection form) should be used to document the BMPs.
- If safely accessible, a listing of the observations at containment areas and outfalls.
- Observations at the outfall documenting the presence or evidence of nonstormwater discharges, pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.) and sources of the discharge.
- List of corrective actions required, including necessary changes to the SWPPP and the associated implementation dates.
- Photographs (to be attached).
- QSP's name, title, and signature.

8.4.3 QUALIFYING STORM EVENT PRE-STORM INSPECTIONS

The QSP will perform inspections within 48 hours prior to each forecasted qualifying rain event. The inspections will be conducted during normal business hours of the construction site. The General Permit requires that dischargers use the weather forecasts from the National Oceanographic and Atmospheric Administration (NOAA). The forecasts can be obtained at http://www.srh.noaa.gov/. Pre-project inspections should be initiated after consulting NOAA for a qualifying rain event with 50% or greater probability of precipitation. The General Permit defines a qualifying rain event as one that produces 0.5 inch or more of precipitation, with a 48-hour or greater period between rain events.

The QSP will visually observe the following during pre-storm inspections:

- Stormwater drainage areas to identify spills, leaks, or uncontrolled pollutant sources
- BMPs to identify whether they have been properly implemented in accordance with the SWPPP
- Stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard

Inspections will be documented using the Construction Site Inspection Report form. The QSP will document the same items listed in the weekly inspections.

8.4.4 DURING RAIN INSPECTIONS

The QSP will conduct at least one inspection for each 24-hour period during extended qualifying storm events. During the excavation or remediation period, inspections will be performed on weekdays and weekends. During the period of stabilization waiting for regulatory closure, inspections will be performed on weekdays. The Construction Site Inspection Report form will be used to document the inspection. The form will include the same information as the prestorm inspection and will also include the following:

- Weather information, including an estimate of the beginning of the qualifying storm event and duration of event, and approximate amount of rainfall in inches;
- Observations at the outfall which will include the documentation of the stormwater discharge pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.) and source(s) of the pollutant discharge, if any;
- If breaches or other shortcomings are observed, repairs or design changes to BMPs will be implemented as soon as safely possible, and generally within 24 hours of identification, and will be completed as soon as possible. The CGP requires corrective actions within 72 hours of identified deficiencies. If design changes are made, the QSD will make the appropriate revisions/amendments to the SWPPP.

8.4.5 POST-STORM INSPECTIONS

Within 48 hours after each qualifying rain event, the QSP will conduct a post-storm visual inspection to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs. If design changes are made, the QSD will make the appropriate revisions/amendments to the SWPPP.

The Construction Site Inspection Report form will be used for the inspection. The form will include the same information as the during rain inspection form and will also include rainfall totals obtained using a local rain gauge.

8.5 STORMWATER QUALITY SAMPLING AND ANALYSIS

Risk Level 2 dischargers are required to collect:

- Samples of stormwater during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in stormwater. Details on nonvisible pollutant monitoring are given in Sections 8.5.1.

8.5.1 NONVISIBLE SAMPLE REQUIREMENTS

The CGP requirements for nonvisible pollutant monitoring are listed below.

- Dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in stormwater.
- Dischargers shall ensure that water samples are of sufficient volume to characterize the site conditions.
- Dischargers shall collect samples at all discharge locations that can be safely accessed.
- Dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours (i.e., 0700 to 1700 on weekdays excluding holidays) and which generate runoff.

- Discharges shall analyze samples for all nonvisible pollutant parameters (if applicable)
- Dischargers shall collect a sample of stormwater that has not come in contact with the disturbed soil or the materials stored or used on-site (an uncontaminated sample) for comparison with the discharge sample. A potential location for the background sample will be identified in a later draft of this SWPPP.
- Discharger shall compare the background sample to the samples of discharge using field analysis or through laboratory analysis.
- Dischargers shall keep all field and/or analytical data in the SWPPP document.

For UXO 1, nonvisible pollutant sampling may occur if stormwater runoff from a disturbed and potentially contaminated area (by historical usage) flows off site. Confirmation soil sample results within the excavation will be used to assess whether the disturbed soil is clean or contaminated. Confirmation soil samples containing a lead concentration greater than the respective Regional Screening Levels (RSL) or pending sample results will be identified as areas with potential contamination. The RSL for lead is 400 milligrams per kilogram. If nonvisible pollutant stormwater sampling is required, samples will be collected and analyzed for lead (EPA Method 200.7) as indicated on Table 8-1.

Analyte	Analytical Method	Minim Sample Volume	Sample Bottle Type	Sample Preservation	Maximum Holding Time
Lead	EPA 200.7	1 Liter	1 liter glass or PE bottle	HNO_3 to pH < 2	6 months

Table 8-1 Sample Collection, Preservation, and Analysis for Monitoring Nonvisible Pollutants

8.5.2 MONITORING PREPARATION

Prior to construction, sampling personnel and alternates will review the CSMP. An adequate stock of monitoring supplies and equipment for monitoring nonvisible pollutants will be available on the project site prior to a sampling event. Monitoring supplies will be stored in a cool environment that will not come into contact with rain or direct sunlight.

Supplies maintained at the project site will include, but are not limited to, surgical gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, resealable storage bags, paper towels, personal rain gear, ice, sampling activity log forms, and COC forms.

8.5.3 SAMPLE COLLECTION AND HANDLING

It is important to use the correct methods to collect and handle samples to ensure the samples are valid. While the handling requirements apply primarily to grab samples collected for laboratory analysis, field measurements can be affected by sample collection procedures.

The General Permit requires dischargers to designate and train personnel to collect, maintain, and ship water quality samples in accordance with the *Surface Water Ambient Monitoring Program [SWAMP] 2008 Quality Assurance Program Plan*, which is available at:

http://www.swrcb.ca.gov/water_issues/programs/swamp/tools.shtml#qa.

Sampling methods and handling procedures are described below. Adherence to sampling guidance (and these procedures) provides for consistent, reproducible, and accurate results. For some constituents, especially trace metals, trace organics, and organic carbon, sampling protocols are very important as contamination of samples due to incorrect sampling protocols is possible. Design of the field sampling procedures should carefully consider contamination potential from sample location (e.g., sediment

disturbances, equipment exhaust), sampling techniques, and sample handling. The QSP or alternate QSP will be trained in the appropriate site-specific methods specified in this CSMP.

Samples will be collected by placing a separate laboratory-provided sample container directly into a stream of water downgradient and close to the potential nonvisible pollutant discharge location. This separate laboratory-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The upgradient and uncontaminated background samples shall be collected first prior to collecting the downgradient to minimize cross-contamination. The sampling personnel will collect the water upgradient of where they are standing. Once the separate laboratory provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte being monitored.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean new pair of nitrile gloves prior to the collection and handling of each sample at each location
- Not contaminate the inside of the sample bottle by not allowing it to come into contact with any material other than the water sample
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection
- Not leave the cooler lid open for an extended period of time once samples are placed inside
- Not sample near a running vehicle where exhaust fumes may impact the sample
- Not touch the exposed end of a sampling tube, if applicable
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles
- Not eat, smoke, or drink during sample collection
- Not sneeze or cough in the direction of an open sample bottle
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample to take place
- Decontaminate sampling equipment prior to sample collection using an Alconox (or equivalent) solution wash, distilled water rinse, and final rinse with distilled water
- Dispose of decontamination water and soaps appropriately; i.e., not discharge to the storm drain system or receiving water

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, and documented on a COC form provided by the analytical laboratory, sealed in a resealable storage bag, placed in an ice-chilled cooler, at as near to 4ºC as practicable, and delivered within 24 hours to the following laboratory which meets California certification requirements:

Laboratory Name: TBD

8.5.4 SAMPLE DOCUMENTATION PROCEDURES

Original data documented on sample bottle identification labels, COC forms, sampling activity logs, and inspection checklists will be recorded using waterproof ink. If an error is made on these documents, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated. Copies of the COC form, sample documents, and documents prepared for the Annual Report will be located in Appendix K.

Sampling and field analysis activities will be documented using the following:

- Sample bottle identification labels: Sampling personnel will attach an identification label to each bottle. At a minimum, the following information will be recorded on the label, as appropriate:

  - Project Name: UXO 1
  - Project Number: 30128.001
  - Unique sample identification number and location:
  - [Project Number]-[Six digit sample collection date]-[Location]
  - (Example: NUMBER-081811-Inlet472) for a sample collected at hypothetical
  - Inlet 472 on 18 August 2011.
  - Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique sample number or designation. (Example: NUMBER-081811-Inlet472-DUP1).
  - Collection date and time (with the exception that time is not recorded on QA/QC sample labels)
  - Analysis constituent
- Use the Construction Site Inspection form to log sampling events as described below.
  - Sampling date
  - Separate times for collected samples and QA/QC samples recorded to the nearest minute
  - Unique sample identification number and location
  - Analysis constituent
  - Names of sampling personnel
  - Weather conditions (including precipitation amount)
  - Field analysis results
  - Other pertinent data
- COC forms: All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the laboratory. COC procedures will be strictly adhered to for QA/QC purposes.
- Construction Site Inspection form: The QSP will document that samples for nonvisible pollutants were taken during a rain event and write the observations from the event as required in the “during storm” inspection.

8.6 WATERSHED MONITORING OPTION

Because the project site is not located in California, the watershed monitoring option is not applicable.

8.7 QUALITY ASSURANCE AND QUALITY CONTROL

An effective QA/QC plan will be implemented as part of the CSMP to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs
- Clean sampling techniques
- Sample COCs
- Data verification

Each of these procedures is discussed in more detail in the following sections.

8.7.1 CONSTRUCTION SITE INSPECTION REPORT FORM

The sampling information in the Construction Site Inspection Report form will include the date and time of water quality sample collections, sampling personnel, sample container identification numbers, and types of samples that were collected. Field observations should be noted for abnormalities at the sampling location (in color, odor, BMPs, etc.).

8.7.2 CLEAN SAMPLING TECHNIQUES

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed previously, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

8.7.3 CHAIN OF CUSTODY

The COC form is an important document used to track samples from collection through analysis to ensure the validity of the sample. Sample COC procedures include the following:

- Proper labeling of samples
- Use of COC forms for all samples

8.7.4 DATA VERIFICATION

After analytical results are received from the analytical laboratory, the data will be verified to assess whether it is complete, accurate, and the appropriate QA/QC requirements were met. The COC and laboratory reports will be checked to make sure requested analysis were performed and samples were accounted for in the reports. Laboratory reports will be checked to make sure hold times were met as specified in Table 8-1. Laboratory reports will also be checked with the UFP-SAP to make sure that the reporting levels meet or are lower than the reporting levels specified on Worksheet #15 of the UFP-SAP.

The reviewer will check data for outlier values and follow up with the laboratory. Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory. Attention should be paid to data that are an order of magnitude or more different than similar locations, or are inconsistent with previous data from the same location.

For laboratory analyses, EPA establishes QA/QC checks and acceptable criteria. These data are typically reported along with the sample results. Data reviewers should evaluate the reported QA/QC data to check for contamination (look at method, field, and equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results. The reviewer will check the data set for outlier values and, accordingly, confirm results and reanalyze samples where appropriate. Sample reanalysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out of the expected range. Initial data, even if outside the expected range may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met. If this occurs, a written statement from the analytical laboratory regarding the validity of the sample result should be obtained.

Similarly, field data will be checked as soon as possible to identify potential errors. Reported data and observations will be verified to ensure that it is complete and accurate and as soon as the field logs are received.

Field logs should be checked to make sure required measurements were completed and appropriately documented. Reported values that appear out of the typical range or inconsistent, will be followed up immediately to identify potential reporting or equipment problems.

Equipment calibration notations should be verified for outlier data, and if appropriate, equipment calibrations should be checked after sampling. Observations noted on the field logs can also help to

identify potential interferences. Notations will be made of any errors and actions taken to correct the equipment or recording errors.

When using a field meter, it is important to record the value and then make note of any possible meter failures or interferences that could have led to an exceedance. Some possible instrument problems may include the need to recalibrate, the need to replace the battery, problems with the sample container (such as scratches on glass or plastic optical sample cells or particles on the outside of the optical sample cells), or fouled probes.

8.8 REPORTING REQUIREMENTS

Dischargers are required to prepare and electronically submit an Annual Report no later than 1 September of each year. The first annual report is required by 1 September 2014. The Annual Reports must be certified in accordance with the Special Provisions in Order 2009-0009-DWQ. The Annual Report must include the following stormwater monitoring information for Risk Level 2:

- A summary and evaluation of sampling and analysis results, including original laboratory reports
- The analytical method(s), method reporting unit(s), and method detection limits (MDLs) of each analytical parameter (analytical results that are less than the MDL must be reported as “less than the MDL” or “<MDL”)
- A summary of all corrective actions taken during the compliance year
- Identification of any compliance activities or corrective actions that were not implemented
- A summary of all violations of the General Permit
- The individual(s) who performed facility inspections, sampling, visual observation (inspections), and/or measurements
- The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge)
- The visual observations and sample collection exception records and reports

A summary of the required documents, in addition to the CSMP, is included in Section

2.7 of this SWPPP. Additionally, Section 2.7 includes the procedures that will be followed to submit the Annual Report.

8.9 RECORDS RETENTION

Dischargers must retain records of stormwater monitoring information and copies of reports (including Annual Reports) for at least three years from date of submittal or longer if required by the RWQCB. Records are to be kept on-site while construction is ongoing.

These records include:

- The date, place, and time of facility inspections, sampling, visual observations (inspections), and/or measurements, including precipitation
- The individual(s) who performed the facility inspections, sampling, visual observations (inspections), and/or measurements
- The date and approximate time of analyses
- The individual(s) who performed the analyses
- A summary of all analytical results from three years, the MDLs and reporting limits, and the analytical techniques or methods used
- Rain gauge readings from site inspections

- QA/QC records and results
- Non-stormwater discharge inspections and visual observations (inspections) and stormwater discharge visual observation records
- Visual observation and sample collection exemption records
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations (inspections), or inspections. Results of field measurements and laboratory analyses (to be kept in the SWPPP)

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9.0 REFERENCES

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10.0 FIGURES

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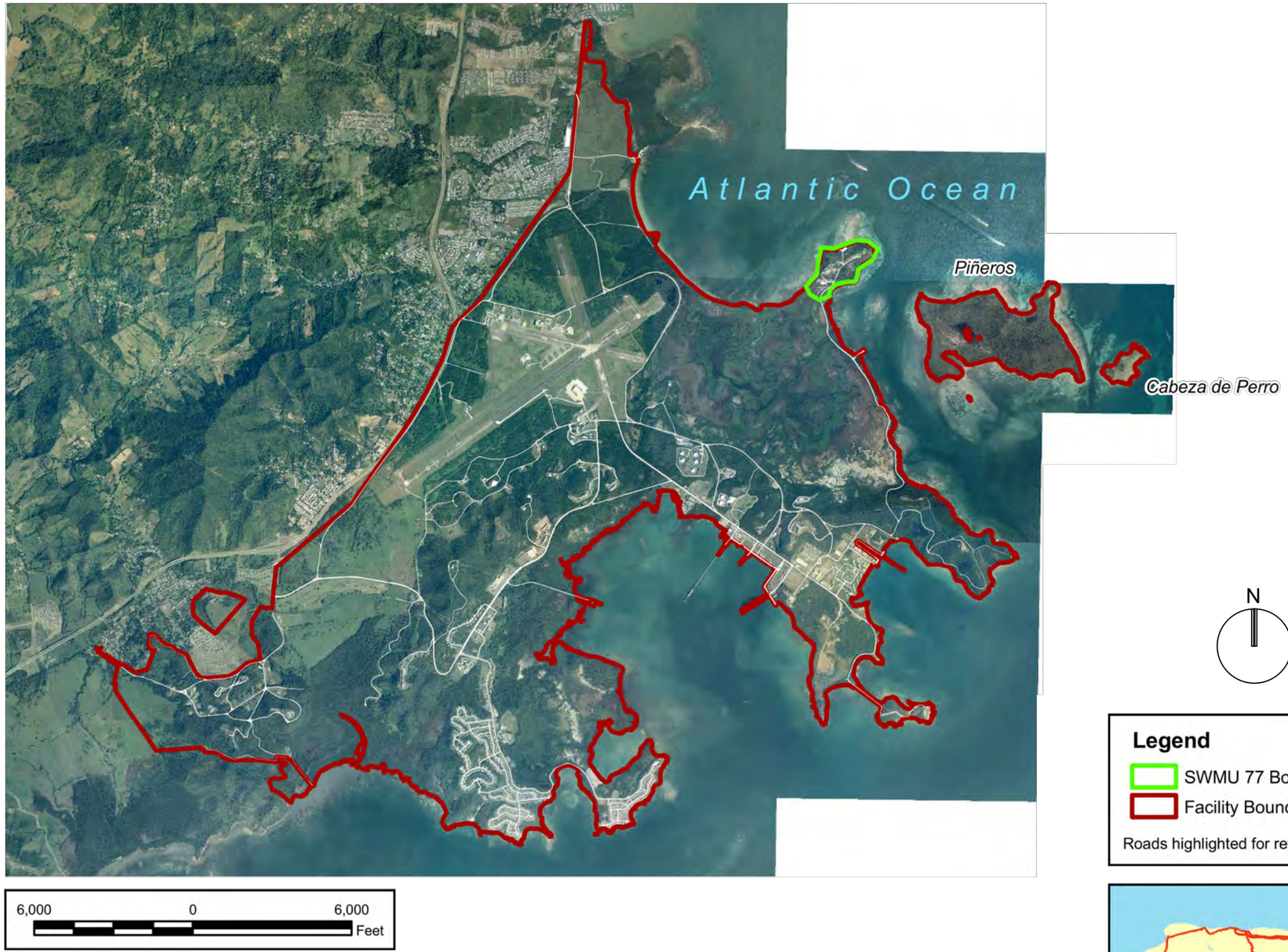

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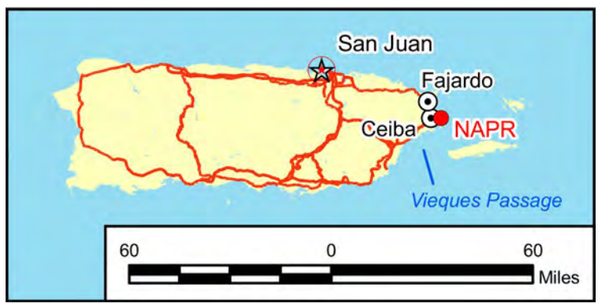
Legend

SWMU 77 Boundary

Facility Boundary

Roads highlighted for reference purposes.



SYM	DESCRIPTION	DATE	APPR

NAVFAC

SEAL

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<COO>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SITE LOCATION MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

SHEET 1 OF 3

1

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: \\hq\Cad\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\SWPPP\Figures\UXO_RFI SWMU 77 Fig1_SWP Site Location Map.dwg LAYOUT NAME: 1 PLOTTED: Thursday, July 11, 2013 - 9:26am USER: pdiez

500 250 0 500 Feet

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SYM	DESCRIPTION	DATE	APPR

NAVFAC

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<XX>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SWMU 77 SUBAREA MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

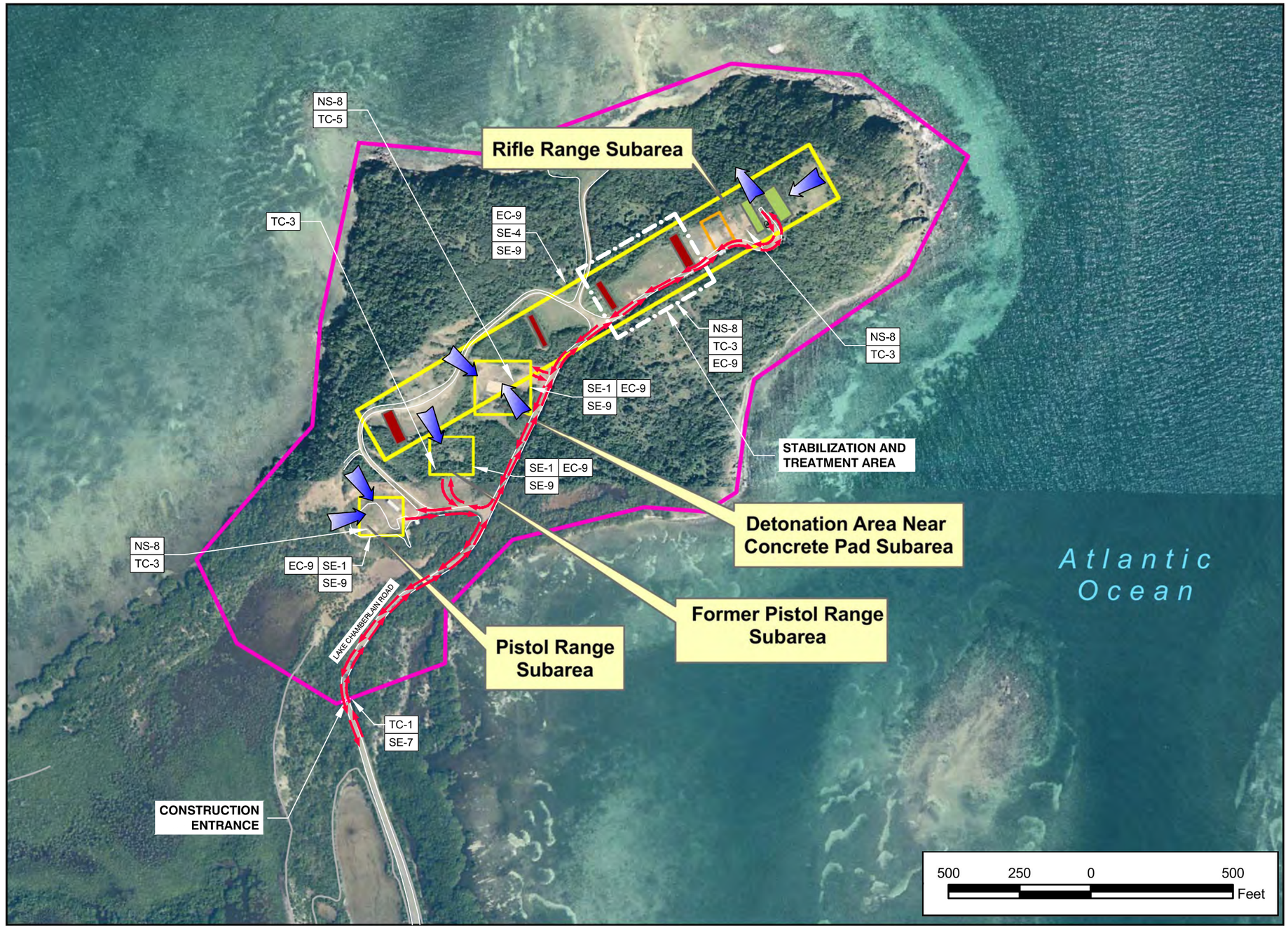
NAVFAC DRAWING NO.

SHEET 2 OF 3

2

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: \\hq\Cad\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\SWPPP\Figures\UXO_RFI SWMU 77 Fig2_SWP Subarea Map.dwg LAYOUT NAME: 2 PLOTTED: Thursday, July 11, 2013 - 9:32am USER: pdiez



LEGEND

- FIRING LINES
- BERM/ EMBANKMENT/ BULLET STOP
- SHORT-YARDAGE RANGE
- SWMU 77 - BOUNDARY
- HAUL ROUTE
- AREA TO BE REMEDIATED FROM FEBRUARY TO MAY 2014. SILT FENCING, SAND BAGS, AND/OR A CLEAN COMPACTED BERM WILL BE INSTALLED ALONG THE PERIMETER AT THE CONSTRUCTION AREA. AFTER THE REMEDIATION PHASE THE AREA WILL BE STABILIZED (EC-4).
- ANTICIPATED DRAINAGE DIRECTION IN EXCAVATION
- TC-1 STABILIZED CONSTRUCTION ENTRANCE/EXIT

NS-8	VEHICLE AND EQUIPMENT CLEANING
EC-9	EARTH DIKES
SE-7	STREET SWEEPING
TC-3	OUTLET TIRE WASH
SE-1	SILT FENCE
SE-9	STRAW BALE BARRIER

NOTE:
CASQA BMP FACT SHEETS (i.e.TC-1) ARE REFERENCED IN THE LOCATIONS WHERE EROSION AND SEDIMENT CONTROL BMPs ARE LOCATED. REFERENCE SHEETS THAT ARE APPLICABLE TO THE PROJECT SITE INCLUDE WM-1: MATERIAL DELIVERY AND STORAGE, WM-2: MATERIAL USE, WM-4: SPILL PREVENTION AND CONTROL, WM-5: SOLID WASTE MANAGEMENT, MW-7: CONTAMINATED SOIL MANAGEMENT, WM-10: LIQUID WASTE MANAGEMENT, NS-1: WATER CONSERVATION PRACTICES, NS-6: ID/IC DETECTION AND REPORTING, EC-1: SCHEDULING, EC-2: PRESERVATION OF EXISTING VEGETATION, EC-15: SOIL PREPARATION/ ROUGHENING, SE-3: SEDIMENT TRAP, AND WE-1: WIND EROSION CONTROL. BMPs WILL BE MAINTAINED AS DESCRIBED IN THE CASQA BMP HANDBOOKS.
SPILL KITS ARE AVAILABLE IN FUEL TRUCKS, AT THE DECONTAMINATION PAD, AND FIELD OFFICE.

SYM	DESCRIPTION	DATE	APPR

NAVFAC

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED
FOR COMMANDER NAVFAC
ACTIVITY
SATISFACTORY TO DATE
DES K.N DRW C.R CHK C.W
<<PM/TM>>
BRANCH MANAGER
CHIEF ENG/ARCH
<<XX>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

WATER POLLUTION CONTROL DRAWING

SCALE: AS NOTED
EPROJECT NO.:
CONSTR. CONTR. NO.
NAVFAC DRAWING NO.
SHEET 3 OF 3
3
DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: C:\Users\user\appdata\local\temp\AcPublish_4712\UXO_RFI SWMU 77 Fig3_SWP water pollution Control.dwg LAYOUT NAME: 2 PLOTTED: Thursday, July 11, 2013 - 1:38pm USER: pdiez

APPENDIX A. CONSTRUCTION GENERAL PERMIT ORDER NO. 2009-0009-DWQ

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5455
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Arnold Schwarzenegger
Governor

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2010-0014-DWQ
NPDES NO. CAS000002

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2009-0009-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ, was adopted by the State Water Resources Control Board on:	**November 16, 2010**
This Order shall become effective on:	**February 14, 2011**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-0009-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on **November 16, 2010.**

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

FINAL ADOPTED CHANGES TO
Order No. 2009-0009-DWQ
November 16, 2010

Fact Sheet pages 11-12 Obtaining and Terminating Permit Coverage

The appropriate Legally Responsible Person (LRP) must obtain coverage under this General Permit~~, except in two limited circumstances. First, where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties, the utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit. Second, where there is a lease of a mineral estate (oil, gas, geothermal, aggregate, precious metals, and/or industrial metals), the lessee is responsible for obtaining coverage under the General Permit.~~ To obtain coverage, the LRP or the LRP's Approved Signatory ~~or other entity described above~~ must file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

Section II(A)(2) Conditions for Permit Coverage, page 14

2. The ~~utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project~~ Legally Responsible Person is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

Section II(C)(4) Conditions for Permit Coverage, page 18

4. When an LRP with active General Permit coverage transfers its LRP status to another person or entity that qualifies as an LRP, the existing LRP shall inform the new LRP of the General Permit's requirements. ~~When an LRP owns property with active General Permit coverage, and the LRP sells the property, or a parcel thereof, to another person, that person shall become an LRP with respect to whatever parcel was sold. The existing LRP shall inform the new LRP of the General Permit's requirements~~. In order for the new LRP to continue the construction-activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

Section IV(I) – Special Provisions pages 24-25

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notices of Terminations (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

   a. The LRP's Approved Signatory must be one of the following:

      i. For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

      ii. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

      iii. For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA);

      iv. For the military: Any military officer who has been designated.

      v. For a public university: An authorized university official

b. 2. Changes to Authorization. If an aApproved sSignatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an aApproved sSignatory.

2. 3. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's aApproved sSignatory as described above.

Attachment A, Section E(9) - Special Provisions pages 10-11

8. Electronic Signature and Certification Requirements

a. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5-Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5-Glossary) must submit all information electronically via SMARTS. ~~For Linear Underground/Overhead projects, the Legally Responsible Person is the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP. The LRP's Approved Signatory must be one of the following:~~

~~i For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:~~

~~(1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or~~

~~(2) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;~~

~~ii For a partnership or sole proprietorship: a general partner or the proprietor, respectively; or~~

~~iii For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).~~

b. Changes to Authorization. If an ~~a~~Approved ~~s~~Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an ~~a~~Approved ~~s~~Signatory.

c. All SWPPP revisions, annual reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, USEPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's ~~a~~Approved ~~s~~Signatory ~~as described above~~.

Appendix 5 – Glossary

Approved Signatory

A person who has been authorized by the Legally Responsible Person ~~legal authority~~ to sign, certify, and electronically submit Permit Registration Documents, ~~and~~ Notices of Termination ~~on behalf of the Legally Responsible Person~~, and any other documents, reports, or information required by the General Permit, the State or Regional Water Board, or U.S. EPA. The Approved Signatory must be one of the following:

1. For a corporation or limited liability company: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation or limited liability company; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

3. For a municipality, State, Federal, or other public agency: a principl~~e~~al executive officer, ranking elected official, city manager, council president, or any other authorized public employee with managerial responsibility over the construction or land disturbance project (including, but not limited to, project manager, project superintendent, or resident engineer);

4. For the military: any military officer or Department of Defense civilian, acting in an equivalent capacity to a military officer, who has been designated;

5. For a public university: an authorized university official;

6. For an individual: the individual, because the individual acts as both the Legally Responsible Person and the Approved Signatory; or

7. For any type of entity not listed above (e.g. trusts, estates, receivers): an authorized person with managerial authority over the construction or land disturbance project.

Legally Responsible Person

The Legally Responsible Person (LRP) will typically be the project proponent. The categories of persons or entities that are eligible to serve as the LRP are set forth below. For any construction or land disturbance project where multiple persons or entities are eligible to serve as the LRP, those persons or entities shall select a single LRP. In exceptional circumstances, a person or entity that qualifies as the LRP may provide written authorization to another person or entity to serve as the LRP. In such a circumstance, the person or entity that provides the authorization retains all responsibility for compliance with the General Permit. Except as provided in category 2(d), a contractor who does not satisfy the requirements of any of the categories below is not qualified to be an LRP.

The following persons or entities may serve as a LRP:

1. ~~The~~ A person, company, agency, or other entity that possesses a real property interest (including, but not limited to, fee simple ownership, easement, leasehold, or other rights of way) in the land ~~who possesses the title of the land or the leasehold interest of a mineral estate~~ upon which the construction or land disturbance activities will occur for the regulated site. ~~For linear underground/overhead projects, it is in the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP.~~

2. In addition to the above, the following persons or entities may also serve as an LRP:

   a. For linear underground/overhead projects, the utility company, municipality, or other public or private company or agency that owns or operates the LUP;

   b. For land controlled by an estate or similar entity, the person who has day-to-day control over the land (including, but not limited to, a bankruptcy trustee, receiver, or conservator);

   c. For pollution investigation and remediation projects, any potentially responsible party that has received permission to conduct the project from the holder of a real property interest in the land; or

   d. For U.S. Army Corp of Engineers projects, the U.S. Army Corps of Engineers may provide written authorization to its bonded contractor to serve as the LRP, provided, however, that the U.S. Army Corps of Engineers is also responsible for compliance with the general permit, as authorized by the Clean Water Act or the Federal Facilities Compliance Act.

State Water Resources Control Board
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Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

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I. BACKGROUND

A. History

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES Program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that established storm water permit application requirements for specified categories of industries. The regulations provide that discharges of storm water to waters of the United States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with an NPDES Permit. Regulations (Phase II Rule) that became final on December 8, 1999 lowered the permitting threshold from five acres to one acre.

While federal regulations allow two permitting options for storm water discharges (Individual Permits and General Permits), the State Water Board has elected to adopt only one statewide General Permit at this time that will apply to most storm water discharges associated with construction activity.

On August 19, 1999, the State Water Board reissued the General Construction Storm Water Permit (Water Quality Order 99-08-DWQ). On December 8, 1999 the State Water Board amended Order 99-08-DWQ to apply to sites as small as one acre.

The General Permit accompanying this fact sheet regulates storm water runoff from construction sites. Regulating many storm water discharges under one permit will greatly reduce the administrative burden associated with permitting individual storm water discharges. To obtain coverage under this General Permit, dischargers shall electronically file the Permit Registration Documents (PRDs), which includes a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other compliance related documents required by this General Permit and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Quality Control Boards (Regional Water Boards) may issue General Permits or Individual Permits containing more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers.

B. Legal Challenges and Court Decisions

1. Early Court Decisions

Shortly after the passage of the CWA, the USEPA promulgated regulations exempting most storm water discharges from the NPDES permit requirements. (See 40 C.F.R. § 125.4 (1975); see also *Natural Resources Defense Council v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1372 (*Costle*); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (*Defenders of Wildlife*).) When environmental groups challenged this exemption in federal court, the District of Columbia Court of Appeals invalidated the regulation, holding that the USEPA "does not have authority to exempt categories of point sources from the permit requirements of [CWA] § 402." (*Costle*, 568 F.2d at 1377.) The *Costle* court rejected the USEPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (*Id.* at 1377-82.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the USEPA had the flexibility under the CWA to design regulations that would overcome these problems. (*Id.* at 1379-83.) In particular, the court pointed to general permits and permits based on requiring best management practices (BMPs).

During the next 15 years, the USEPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (See *Defenders of Wildlife*, 191 F.3d at 1163; see also Gallagher, Clean Water Act in Environmental Law Handbook (Sullivan, edit., 2003)
p. 300 (Environmental Law Handbook); Eisen, *Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Storm Water Runoff* (1995) 48 Wash. U.J. Urb. & Contemp. L.1, 40-41 [Regulation of Urban Storm Water Runoff].)

In 1987, Congress amended the CWA to require NPDES permits for storm water discharges. (See CWA § 402(p), 33 U.S.C. § 1342(p); *Defenders of Wildlife,* 191 F.3d at 1163; *Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to industrial storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this section and section 1311 [requiring the USEPA to establish effluent limitations under specific timetables]." (CWA § 402(p)(3)(A), 33 U.S.C. § 1342(p)(3)(A); see also *Defenders of Wildlife,* 191 F.3d at 1163-64.)

In 1990, USEPA adopted regulations specifying what activities were considered "industrial" and thus required discharges of storm water associated with those activities to obtain coverage under NPDES permits. (55 Fed. Reg. 47,990 (1990); 40 C.F.R. § 122.26(b)(14).) Construction activities, deemed a subset of the industrial activities category, must also be regulated by an NPDES permit. (40 C.F.R. § 122.26(b)(14)(x)). In 1999, USEPA issued regulations for "Phase II" of storm water regulation, which required most small construction sites (1-5 acres) to be regulated under the NPDES program. (64 Fed. Reg. 68,722; 40 C.F.R. § 122.26(b)(15)(i).)

2. Court Decisions on Public Participation

Two recent federal court opinions have vacated USEPA rules that denied meaningful public review of NPDES permit conditions. On January 14, 2003, the Ninth Circuit Court of Appeals held that certain aspects of USEPA's Phase II regulations governing MS4s were invalid primarily because the general permit did not contain express requirements for public participation. (*Environmental Defense Center v. USEPA* (9th Cir. 2003) 344 F.3d 832.) Specifically, the court determined that applications for general permit coverage (including the Notice of Intent (NOI) and Storm Water Management Program (SWMP)) must be made available to the public, the applications must be reviewed and determined to meet the applicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. (*Id.* at 852-54.) Similarly, on February 28, 2005, the Second Circuit Court of Appeals held that the USEPA's confined animal feeding operation (CAFO) rule violated the CWA because it allowed dischargers to write their own nutrient management plans without public review. (*Waterkeeper Alliance v. USEPA* (2d Cir. 2005) 399 F.3d 486.) Although neither decision involved the issuance of construction storm water permits, the State Water Board's Office of Chief Counsel has recommended that the new General Permit address the courts' rulings where feasible[1].

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[1] In *Texas Independent Producers and Royalty Owners Assn. v. USEPA* (7th Cir. 2005) 410 F.3d 964, the Seventh Circuit Court of Appeals held that the USEPA's construction general permit was not required to provide the public with the opportunity for a public hearing on the Notice of Intent or Storm Water Pollution Prevention Plan. The Seventh Circuit briefly discussed why it agreed with the Ninth Circuit's dissent in *Environmental Defense Center*, but

The CWA and the USEPA's regulations provide states with the discretion to formulate permit terms, including specifying best management practices (BMPs), to achieve strict compliance with federal technology-based and water quality-based standards. (*Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1308.) Accordingly, this General Permit has developed specific BMPs as well as numeric action levels (NALs) in order to achieve these minimum federal standards. In addition, the General Permit requires a SWPPP and REAP (another dynamic, site-specific plan) to be developed but has removed all language requiring the discharger to implement these plans – instead, the discharger is required to comply with specific requirements. By requiring the dischargers to implement these specific BMPs and NALs, this General Permit ensures that the dischargers do not "write their own permits." As a result this General Permit does not require each discharger's SWPPP and REAP to be reviewed and approved by the Regional Water Boards.

This General Permit also requires dischargers to electronically file all permit-related compliance documents. These documents include, but are not limited to, NOIs, SWPPPs, annual reports, Notice of Terminations (NOTs), and numeric action level (NAL) exceedance reports. Electronically submitted compliance information is immediately available to the public, as well as the Regional Water Quality Control Board (Regional Water Board) offices, via the Internet. In addition, this General Permit enables public review and hearings on permit applications when appropriate. Under this General Permit, the public clearly has a meaningful opportunity to participate in the permitting process.

---

generally did not discuss the substantive holdings in *Environmental Defense Center* and *Waterkeeper Alliance*, because neither court addressed the initial question of whether the plaintiffs had standing to challenge the permits at issue. However, notwithstanding the Seventh Circuit's decision, it is not binding or controlling on the State Water Board because California is located within the Ninth Circuit.

C. Blue Ribbon Panel of Experts and Feasibility of Numeric Effluent Limitations

In 2005 and 2006, the State Water Board convened an expert panel (panel) to address the feasibility of numeric effluent limitations (NELs) in California's storm water permits. Specifically, the panel was asked to address:

"Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in storm water permits? How would such limitations or criteria be established, and what information and data would be required?"

"The answers should address industrial general permits, construction general permits, and area-wide municipal permits. The answers should also address both technology-based limitations or criteria and water quality-based limitations or criteria. In evaluating establishment of any objective criteria, the panel should address all of the following:

The ability of the State Water Board to establish appropriate objective limitations or criteria;

How compliance determinations would be made;

The ability of dischargers and inspectors to monitor for compliance; and

The technical and financial ability of dischargers to comply with the limitations or criteria."

Through a series of public participation processes (State Water Board meetings, State Water Board workshops, and the solicitation of written comments), a number of water quality, public process and overall program effectiveness problems were identified. Some of these problems are addressed through this General Permit.

D. Summary of Panel Findings on Construction Activities

The panel's final report can be downloaded and viewed through links at www.waterboards.ca.gov or by clicking here[2].

The panel made the following observations:

"Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge."

"Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes."

[2] http://www.waterboards.ca.gov/stormwtr/docs/numeric/swpanel_final_report.pdf

“Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have as yet only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use.”

“To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites.”

“Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors.”

“The quality of storm water discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography.”

“The States of Oregon and Washington have recently adopted similar concepts to the Action Levels described earlier.”

In addition, the panel made the following conclusions:

“It is the consensus of the Panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with storm water discharges from construction sites (e.g. TSS and turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible.”

“The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers/equipment is exposed to storm water.”

“The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond.”

E. How the Panel’s Findings are Used in this General Permit

The State Water Board carefully considered the findings of the panel and related public comments. The State Water Board also reviewed and considered the comments regarding statewide storm water policy and the reissuance of the Industrial General Permit. From the input received the State Water Board identified some permit and program performance gaps that are addressed in this General Permit. The Summary of Significant Changes (below) in this General Permit are a direct result of this process.

F. Summary of Significant Changes in This General Permit

The State Water Board has significant changes to Order 99-08-DWQ. This General Permit differs from Order 99-08-DWQ in the following significant ways:

Rainfall Erosivity Waiver: this General Permit includes the option allowing a small construction site (>1 and <5 acres) to self-certify if the rainfall erosivity value (R value) for their site's given location and time frame compute to be less than or equal to 5.

Technology-Based Numeric Action Levels: this General Permit includes NALs for pH and turbidity.

Risk-Based Permitting Approach: this General Permit establishes three levels of risk possible for a construction site. Risk is calculated in two parts: 1) Project Sediment Risk, and 2) Receiving Water Risk.

Minimum Requirements Specified: this General Permit imposes more minimum BMPs and requirements that were previously only required as elements of the SWPPP or were suggested by guidance.

Project Site Soil Characteristics Monitoring and Reporting: this General Permit provides the option for dischargers to monitor and report the soil characteristics at their project location. The primary purpose of this requirement is to provide better risk determination and eventually better program evaluation.

Effluent Monitoring and Reporting: this General Permit requires effluent monitoring and reporting for pH and turbidity in storm water discharges. The purpose of this monitoring is to evaluate whether NALs and NELs for Active Treatment Systems included in this General Permit are exceeded.

Receiving Water Monitoring and Reporting: this General Permit requires some Risk Level 3 and LUP Type 3 dischargers to monitor receiving waters and conduct bioassessments.

Post-Construction Storm Water Performance Standards: this General Permit specifies runoff reduction requirements for all sites not covered by a Phase I or Phase II MS4 NPDES permit, to avoid, minimize and/or mitigate post-construction storm water runoff impacts.

Rain Event Action Plan: this General Permit requires certain sites to develop and implement a Rain Event Action Plan (REAP) that must be designed to protect all exposed portions of the site within 48 hours prior to any likely precipitation event.

Annual Reporting: this General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and pubic information.

Certification/Training Requirements for Key Project Personnel: this General Permit requires that key personnel (e.g., SWPPP preparers, inspectors, etc.) have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure their ability to design and evaluate project specifications that will comply with General Permit requirements.

Linear Underground/Overhead Projects: this General Permit includes requirements for all Linear Underground/Overhead Projects (LUPs).

II. RATIONALE

A. General Permit Approach

A general permit for construction activities is an appropriate permitting approach for the following reasons:

1. A general permit is an efficient method to establish the essential regulatory requirements for a broad range of construction activities under differing site conditions;

2. A general permit is the most efficient method to handle the large number of construction storm water permit applications;

3. The application process for coverage under a general permit is far less onerous than that for individual permit and hence more cost effective;

4. A general permit is consistent with USEPA's four-tier permitting strategy, the purpose of which is to use the flexibility provided by the CWA in designing a workable and efficient permitting system; and

5. A general permit is designed to provide coverage for a group of related facilities or operations of a specific industry type or group of industries. It is appropriate when the discharge characteristics are sufficiently similar, and a standard set of permit requirements can effectively provide environmental protection and comply with water quality standards for discharges. In most cases, the general permit will provide sufficient and appropriate management requirements to protect the quality of receiving waters from discharges of storm water from construction sites.

There may be instances where a general permit is not appropriate for a specific construction project. A Regional Water Board may require any discharger otherwise covered under the General Permit to apply for and obtain an Individual Permit or apply for coverage under a more specific General Permit. The Regional Water Board must determine that this General Permit does not provide adequate assurance that water quality will be protected, or that there is a site-specific reason why an individual permit should be required.

B. Construction Activities Covered

1. **Construction activity subject to this General Permit:**

Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or sale of one or more acres of disturbed land surface.

Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to USEPA regulations, such as dairy barns or food processing facilities.

Construction activity associated with LUPs including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete

and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[3]

Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction[4] (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction projects that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the project.

2. Linear Underground/Overhead Projects (LUPs) subject to this General Permit:

Underground/overhead facilities typically constructed as LUPs include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Water Quality Order 2003-0007-DWQ regulated construction activities associated with small LUPs that resulted in land disturbances greater than one acre, but less than five acres. These projects were considered non-traditional construction projects. Attachment A of this Order now regulates all construction activities from LUPs resulting in land disturbances greater than one acre.

3. Common Plan of Development or Sale

USEPA regulations include the term “common plan of development or sale” to ensure that acreage within a common project does not artificially escape the permit requirements because construction activities are phased, split among smaller parcels, or completed by different owners/developers. In the absence of an

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[3] Pursuant to the Ninth Circuit Court of Appeals’ decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the USEPA’s petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

[4] A construction site that includes a dredge and/or fill discharge to any water of the United States (e.g., wetland, channel, pond, or marine water) requires a CWA Section 404 permit from the U.S. Army Corps of Engineers and a CWA Section 401 Water Quality Certification from the Regional Water Board or State Water Board.

exact definition of “common plan of development or sale,” the State Water Board is required to exercise its regulatory discretion in providing a common sense interpretation of the term as it applies to construction projects and permit coverage. An overbroad interpretation of the term would render meaningless the clear “one acre” federal permitting threshold and would potentially trigger permitting of almost any construction activity that occurs within an area that had previously received area-wide utility or road improvements.

Construction projects generally receive grading and/or building permits (Local Permits) from local authorities prior to initiating construction activity. These Local Permits spell out the scope of the project, the parcels involved, the type of construction approved, etc. Referring to the Local Permit helps define “common plan of development or sale.” In cases such as tract home development, a Local Permit will include all phases of the construction project including rough grading, utility and road installation, and vertical construction. All construction activities approved in the Local Permit are part of the common plan and must remain under the General Permit until construction is completed. For custom home construction, Local Permits typically only approve vertical construction as the rough grading, utilities, and road improvements were already independently completed under the a previous Local Permit. In the case of a custom home site, the homeowner must submit plans and obtain a distinct and separate Local Permit from the local authority in order to proceed. It is not the intent of the State Water Board to require permitting for an individual homeowner building a custom home on a private lot of less than one acre if it is subject to a separate Local Permit. Similarly, the installation of a swimming pool, deck, or landscaping that disturbs less than one acre that was not part of any previous Local Permit are not required to be permitted.

The following are several examples of construction activity of less than one acre that would require permit coverage:

a. A landowner receives a building permit(s) to build tract homes on a 100-acre site split into 200 one-third acre parcels, (the remaining acreage consists of streets and parkways) which are sold to individual homeowners as they are completed. The landowner completes and sells all the parcels except for two. Although the remaining two parcels combined are less than one acre, the landowner must continue permit coverage for the two parcels.

b. One of the parcels discussed above is sold to another owner who intends to complete the construction as already approved in the Local Permit. The new landowner must file Permit Registration Documents (PRDs) to complete the construction even if the new landowner is required to obtain a separate Local Permit.

c. Landowner in (1) above purchases 50 additional one half-acre parcels adjacent to the original 200-acre project. The landowner seeks a Local Permit (or amendment to existing Local permit) to build on 20 parcels while leaving the remaining 30 parcels for future development. The landowner must amend PRDs to include the 20 parcels 14 days prior to commencement of construction activity on those parcels.

C. Construction Activities Not Covered

1. Traditional Construction Projects Not Covered

This General Permit does not apply to the following construction activity:

a. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

b. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

c. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

d. Discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction projects in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit. Construction projects within the Lahontan region must also comply with the Lahontan Region Project Guideline for Erosion Control (R6T-2005-0007 Section), which can be found at **http://www.waterboards.ca.gov/lahontan/Adopted_Orders/2005/r6t_2005_0007.pdf**

e. Construction activity that disturbs less than one acre of land surface, unless part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

f. Construction activity covered by an individual NPDES Permit for storm water discharges.

g. Landfill construction activity that is subject to the Industrial General Permit.

h. Construction activity that discharges to Combined Sewer Systems.

i. Conveyances that discharge storm water runoff combined with municipal sewage.

j. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

2. **Linear Projects Not Covered**

a. LUP construction activity does not include linear routine maintenance projects. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements, or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

i. Maintain the original purpose of the facility or hydraulic capacity.

ii. Update existing lines[5] and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.

iii. Repairing leaks.

[5]Update existing lines includes replacing existing lines with new materials or pipes.

Routine maintenance does not include construction of new[6] lines or facilities resulting from compliance with applicable codes, standards, and regulations.

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must secure new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.

b. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

c. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered construction activities where all other LUP construction activities associated with the tie-in are covered by an NOI and SWPPP of a third party or municipal agency.

3. **EPA's Small Construction Rainfall Erosivity Waiver**

EPA's Storm Water Phase II Final Rule provides the option for a Small Construction Rainfall Erosivity Waiver. This waiver applies to small construction sites between 1 and 5 acres, and allows permitting authorities to waive those sites that do not have adverse water quality impacts.

Dischargers eligible for this waiver are exempt from Construction General Permit Coverage. In order to obtain the waiver, the discharger must certify to the State Water Board that small construction activity will occur only when the rainfall erosivity factor is less than 5 ("R" in the Revised Universal Soil Loss Equation). The period of construction activity begins at initial earth disturbance and ends with final stabilization. Where vegetation will be used for final stabilization, the date of installation of a practice that provides interim non-vegetative stabilization can be used for the end of the construction period. The operator must agree (as a condition waiver eligibility) to periodically inspect and properly maintain the area until the criteria for final stabilization as defined in the General Permit have been met. If use of this interim stabilization eligibility condition was relied on to qualify for the waiver, signature on the waiver with a certification statement constitutes acceptance of and commitment to complete the final stabilization process. The discharger must submit a waiver certification to the State Board prior to commencing construction activities.

USEPA funded a cooperative agreement with Texas A&M University to develop an online rainfall erosivity calculator. Dischargers can access the calculator from EPA's website at: www.epa.gov/npdes/stormwater/cgp. Use of the calculator allows the discharger to determine potential eligibility for the rainfall erosivity waiver. It may also be useful in determining the time periods during which construction activity could be waived from permit coverage.

[6]New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

D. Obtaining and Terminating Permit Coverage

The appropriate Legally Responsible Person (LRP) must obtain coverage under this General Permit. To obtain coverage, the LRP or the LRP's Approved Signatory must file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

To obtain coverage under this General Permit, LRPs must electronically file the PRDs, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by this General Permit, and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Boards may issue General Permits or Individual Permits that contain more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers that obtain coverage under Individual Permits.

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

The application requirements of the General Permit establish a mechanism to clearly identify the responsible parties, locations, and scope of operations of dischargers covered by the General Permit and to document the discharger's knowledge of the General Permit's requirements.

This General Permit provides a grandfathering exception to existing dischargers subject to Water Quality Order No. 99-08-DWQ. Construction projects covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at Risk Level 1. LUP projects covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage at LUP Type 1. The Regional Water Boards have the authority to require Risk Determination to be performed on projects currently covered under Water Quality Order No. 99-08-DWQ and 2003-0007-DWQ where they deem necessary.

LRPs must file a Notice of Termination (NOT) with the Regional Water Board when construction is complete and final stabilization has been reached or ownership has been transferred. The discharger must certify that all State and local requirements have been met in accordance with this General Permit. In order for construction to be found complete, the discharger must install post-construction storm water management measures and establish a long-term maintenance plan. This requirement is intended to ensure that the post-construction conditions at the project site do not cause or contribute to direct or indirect water quality impacts (i.e., pollution and/or hydromodification) upstream and downstream. Specifically, the discharger must demonstrate compliance with the post-construction standards set forth in this General Permit (Section XIII). The discharger is responsible for all compliance issues including all annual fees until the NOT has been filed and approved by the local Regional Water Board.

E. Discharge Prohibitions

This General Permit authorizes the discharge of storm water to surface waters from construction activities that result in the disturbance of one or more acres of land, provided that the discharger satisfies all permit conditions set forth in the Order. This General Permit prohibits the discharge of pollutants other than storm water and non-storm water discharges authorized by this General Permit or another NPDES permit. This General Permit also prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges. In addition, this General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine Regional Water Boards. Discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural BMPs. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction projects. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Therefore this General Permit authorizes such discharges provided they meet the following conditions.

These authorized non-storm water discharges must:

1. be infeasible to eliminate;
2. comply with BMPs as described in the SWPPP;
3. filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins;
4. meet the NALs for pH and turbidity; and
5. not cause or contribute to a violation of water quality standards.

Additionally, authorized non-storm water discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. Authorized non-storm water dewatering discharges may require a permit because some Regional Water Boards have adopted General Permits for dewatering discharges.

This General Permit prohibits the discharge of storm water that causes or threatens to cause pollution, contamination, or nuisance.

F. Effluent Standards for All Types of Discharges

1. Technology-Based Effluent Limitations

Permits for storm water discharges associated with construction activity must meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize best available technology economically achievable (BAT) for toxic pollutants and non conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. Additionally, these provisions require controls of pollutant discharges to reduce pollutants and any more stringent controls necessary to meet water quality standards. The USEPA has already established such limitations, known as effluent limitation guidelines (ELGs), for some industrial categories. This is not the case with construction discharges. In instances where there are no ELGs the permit writer is to use best professional judgment (BPJ) to establish requirements that the discharger must meet using BAT/BCT technology. This General Permit contains only narrative effluent limitations and does not contain numeric effluent limitations, except for Active Treatment Systems (ATS).

Order No. 2009-0009-DWQ, as originally adopted by the State Water Board on September 2, 2009, contained numeric effluent limitations for pH (within the range of 6.0 and 9.0 pH units) and turbidity (500 NTU) that applied only to Risk Level 3 and LUP Type 3 construction sites. The State Water Board adopted the numeric effluent limitations as technology-based effluent limitations based upon its best professional judgment. The California Building Industry Association, the Building Industry Legal Defense

Foundation, and the California Business Properties Association (petitioners) challenged Order No. 2009-0009-DWQ in *California Building Industry Association et al. v. State Water Resources Control Board*. On December 27, 2011, the Superior Court issued a judgment and writ of mandamus. The Superior Court ruled in favor of the State Water Board on almost all of the issues the petitioners raised, but the Superior Court invalidated the numeric effluent limitations for pH and turbidity for Risk Level 3 and LUP Type 3 sites because it determined that the State Water Board did not have sufficient BMP performance data to support those numeric effluent limitations. Therefore, the Superior Court concluded that the State Water Board did not comply with the federal regulations that apply to the use of best professional judgment. In invalidating the numeric effluent limitations, the Superior Court also suspended two ancillary requirements (a compliance storm event provision and receiving water monitoring at Risk Level 3 and LUP Type 3 sites that violated the numeric effluent limitations) that related solely to the invalidated numeric effluent limitations.

As a result of the Superior Court's writ of mandamus, this Order no longer contains numeric effluent limitations for pH and turbidity, except for ATS. In addition, as a result of the Superior Court's writ of mandamus, the receiving water monitoring requirements for Risk Level 3 and LUP Type 3 sites were suspended until the State Water Board amended this Order to restore the receiving water monitoring requirements. As amended, this Order now requires Risk Level 3 and LUP Type 3 Dischargers with direct discharges to surface waters to conduct receiving water monitoring whenever their effluent exceeds specified receiving water monitoring triggers. The receiving water monitoring triggers were established at the same levels as the previous numeric effluent limitations (effluent pH outside the range of 6.0 and 9.0 pH units or turbidity exceeding 500 NTU). In restoring the receiving water monitoring requirements, the State Water Board determined that it was appropriate to require receiving water monitoring for these types of sites with direct discharges to surface waters that exceeded the receiving water monitoring triggers under any storm event scenarios, because these sites represent the highest threat to receiving water quality. An exceedance of a receiving water monitoring trigger does not constitute a violation of this General Permit. These receiving water monitoring requirements take effect on the effective date of the amendment to this Order.

BAT/BCT technologies not only include passive systems such as conventional runoff and sediment control, but-also treatment systems such as coagulation/flocculation using sand filtration, when appropriate. Such technologies allow for effective treatment of soil particles less 0.02 mm (medium silt) in diameter. The discharger must install structural-controls, as necessary, such as erosion and sediment controls that meet BAT and BCT to achieve compliance with water quality standards. The narrative effluent limitations constitute compliance with the requirements of the CWA.

Because the permit is an NPDES permit, there is no legal requirement to address the factors set forth in Water Code sections 13241 and 13263, unless the permit is more stringent than what federal law requires. (See *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 618, 627.) None of the requirements in this permit are more stringent than the minimum federal requirements, which include technology-based requirements achieving BAT/BCT and strict compliance with water quality standards. The inclusion of numeric effluent limitations (NELs) in the permit for Active Treatment Systems does not cause the permit to be more stringent than current federal law. NELs and best management practices are simply two different-methods of achieving the same federal requirement: strict compliance with state water quality standards. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The use of NELs to achieve compliance with water quality standards is not a more stringent requirement than the use of BMPs. (State Water Board Order No. WQ 2006-0012 (*Boeing*).) Accordingly, the State Water Board does not need to take into account the factors in Water Code sections 13241 and 13263.

The State Water Board has concluded that the establishment of BAT/BCT will not create or aggravate other environmental problems through increases in air pollution, solid waste generation, or energy consumption.–While there may be a slight increase in non-water quality impacts due to the implementation of additional monitoring or the construction of additional BMPs, these impacts will be negligible in comparison with the construction activities taking place on site and would be justified by the water quality benefits associated with compliance.

pH Receiving Water Monitoring Trigger

Given the potential contaminants, the minimum standard method for control of pH in runoff requires the use of preventive measures such as avoiding concrete pours during rainy weather, covering concrete and directing flow away from fresh concrete if a pour occurs during rain, covering scrap drywall and stucco materials when stored outside and potentially exposed to rain, and other housekeeping measures. If necessary, pH-impaired storm water from construction sites can be treated in a filter or settling pond or basin, with additional natural or chemical treatment required to meet pH limits set forth in this permit. The basin or pond acts as a collection point and holds storm water for a sufficient period for the contaminants to be settled out, either naturally or artificially, and allows any additional treatment to take place. The State Water Board considers these techniques to be equivalent to BCT. In determining the pH concentration trigger for discharges, the State Water Board used BPJ to set these limitations.

The chosen trigger was established by calculating three standard deviations above and below the mean pH of runoff from highway construction sites[7] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.0 to 9.0 pH Units.

Turbidity Receiving Water Monitoring Trigger

The Turbidity receiving water monitoring trigger of 500 NTU is a technology-based trigger and was developed using three different analyses aimed at finding the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality and cost-effectiveness. The analyses fell into three, main types: (1) an ecoregion-specific dataset developed by Simon et. al. (2004) [8]; (2) Statewide Regional Water Quality Control Board enforcement data; and (3) published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites.

A 1:3 relationship between turbidity (expressed as NTU) and suspended sediment concentration (expressed as mg/L) is assumed based on a review of suspended sediment and turbidity data from three gages used in the USGS National Water Quality Assessment Program:

USGS 11074000 SANTA ANA R BL PRADO DAM CA
USGS 11447650 SACRAMENTO R A FREEPORT CA
USGS 11303500 SAN JOAQUIN R NR VERNALIS CA

The receiving water monitoring trigger represents staff determination that the trigger value is the most practicable based on available data. The turbidity receiving water monitoring trigger represents a bridge between the narrative effluent limitations and receiving water limitations. To support this receiving water monitoring trigger, State Water Board staff analyzed construction site discharge information (monitoring data, estimates) and receiving water monitoring information.

Since the turbidity receiving water monitoring trigger represents an appropriate threshold level expected at a site, compliance with this value does not necessarily represent compliance with either the narrative effluent limitations (as enforced through the BAT/BCT standard) or the receiving water limitations. In the San Diego region, some inland surface waters have a receiving water objective for turbidity equal to 20 NTU. Obviously a discharge up to, but not exceeding, the turbidity receiving water monitoring trigger of

[7] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.

500 NTU may still cause or contribute to the exceedance of the 20 NTU standard. Most of the waters of the State are protected by turbidity objectives based on background conditions.

Table 1 - Regional Water Board Basin Plans, Water Quality Objectives for Turbidity

REGIONAL WATER BOARD	WQ Objective	Background/Natural Turbidity	Maximum Increase
1	Based on background	All levels	20%
2	Based on background	> 50 NTU	10%
3	Based on background	0-50 JTU 50-100 JTU > 100 JTU	20% 10 NTU 10%
4	Based on background	0-50 NTU > 50 NTU	20% 10%
5	Based on background	0-5 NTU 5-50 NTU 50-100 NTU >100 NTU	1 NTU 20% 10 NTU 10%
6	Based on background	All levels	10%
7	Based on background	N/A	N/A
8	Based on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%
9	Inland Surface Waters, 20 NTU All others, based on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%

Table 2 shows the suspended sediment concentrations at the 1.5 year flow recurrence interval for the 12 ecoregions in California from Simon et. al (2004).

Table 2 - Results of Ecoregion Analysis

Ecoregion	Percent of California Land Area	Median Suspended Sediment Concentration (mg/L)
1	9.1	874
4	0.2	120
5	8.8	35.6
6	20.7	1530
7	7.7	122
8	3.0	47.4
9	9.4	284
13	5.2	143
14	21.7	5150
78	8.1	581
80	2.4	199
81	3.7	503
Area-weighted average		1633

If a 1:3 relationship between turbidity and suspended sediment is assumed, the median turbidity is 544 NTU.

The following table is composed of turbidity readings measured in NTUs from administrative civil liability (ACL) actions for construction sites from 2003 - 2009. This data was derived from the complete listing of construction-related ACLs for the six year period. All ACLs were reviewed and those that included turbidimeter readings at the point of storm water discharge were selected for this dataset.

Table 3 – ACL Sampling Data taken by Regional Water Board Staff

WDID#	Region	Discharger	Turbidity (NTU)
5S34C331884	5S	Bradshaw Interceptor Section 6B	1800
5S05C325110	5S	Bridalwood Subdivision	1670
5S48C336297	5S	Cheyenne at Browns Valley	1629
5R32C314271	5R	Grizzly Ranch Construction	1400
6A090406008	6T	El Dorado County Department of Transportation, Angora Creek	97.4
5S03C346861	5S	TML Development, LLC	1600
6A31C325917	6T	Northstar Village	See Subdata Set

Subdata Set - Turbidity for point of storm water runoff discharge at Northstar Village

Date	Turbidity (NTU)	Location
10/5/2006	900	Middle Martis Creek
11/2/2006	190	Middle Martis Creek
01/04/2007	36	West Fork, West Martis Creek
02/08/2007	180	Middle Martis Creek
02/09/2007	130	Middle Martis Creek
02/09/2007	290	Middle Martis Creek
02/09/2007	100	West Fork, West Martis Creek
02/10/2007	28	Middle Martis Creek
02/10/2007	23	Middle Martis Creek
02/10/2007	32	Middle Martis Creek
02/10/2007	12	Middle Martis Creek
02/10/2007	60	West Fork, West Martis Creek
02/10/2007	34	West Fork, West Martis Creek

A 95% confidence interval for mean turbidity in an ACL order was constructed. The data set used was a small sample size, so the 500 NTU (the value derived as the receiving water monitoring trigger for this General Permit) needed to be verified as a possible population mean. In this case, the population refers to a hypothetical population of turbidity measurements of which our sample of 20 represents. A t-distribution was assumed due to the small sample size:

Mean: 512.23 NTU
Standard Deviation: 686.85
Margin of Error: 321.45
Confidence Interval: 190.78 NTU (Low)
833.68 NTU (High)

Based on a constructed 95% confidence interval, an ACL order turbidity measurement will be between 190.78 – 833.68 NTU. 500 NTU falls within this range. Using the same data set, a small-sample hypothesis test was also performed to test if the ACL turbidity data set contains enough information to cast doubt on choosing a 500 NTU as a mean. 500 NTU was again chosen due to its proposed use as an acceptable value. The test was carried out using a 95% confidence interval. Results indicated that the ACL turbidity data set *does not* contain significant sample evidence to reject the claim of 500 NTU as an acceptable mean for the ACL turbidity population.

There are not many published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites. The most often cited study is a report titled, "Improving the Cost Effectiveness of Highway Construction Site Erosion and Pollution Control" (Horner, Guedry, and Kortenhof 1990, http://www.wsdot.wa.gov/Research/Reports/200/200.1.htm). In a comment letter summarizing this report sent to the State Water Board, the primary author, Dr. Horner, states:

"The most effective erosion control product was wood fiber mulch applied at two different rates along with a bonding agent and grass seed in sufficient time before the tests to achieve germination. Plots treated in this way reduced influent turbidity by more than 97 percent and discharged effluent exhibiting mean and maximum turbidity values of 21 and 73 NTU, respectively. Some other mulch and blanket materials performed nearly as well. These tests demonstrated the control ability of widely available BMPs over a very broad range of erosion potential."

Other technologies studied in this report produced effluent quality at or near 100 NTU. It is the BPJ of the State Water Board staff that erosion control, while preferred, is not always an option on construction sites and that technology performance in a controlled study showing effluent quality directly leaving a BMP is always easier and cheaper to control than effluent being discharged from the project (edge of property, etc.). As a result, it is the BPJ of the State Water Board staff that it is not cost effective or feasible, at this time, for all risk level and type 3 sites in California to achieve effluent discharges with turbidity values that are less than 100 NTU.

To summarize, the analysis showed that: (1) results of the Simon et. al dataset reveals turbidity values in background receiving water in California's ecoregions range from 16 NTU to 1716 NTU (with a mean of 544 NTU); (2) based on a constructed 95% confidence interval, construction sites will be subject to administrative civil liability (ACL) when their turbidity measurement falls between 190.78 – 833.68 NTU; and (3) sites with highly controlled discharges employing and maintaining good erosion control practices can discharge effluent from the BMP with turbidity values less than 100 NTU. State Water Board staff has determined, using its BPJ, that it is most cost effective to set the receiving water monitoring trigger for turbidity at 500 NTU.

i. *Compliance Storm Event*

While this General Permit no longer contains "compliance storm event" exceptions from technology-based NELs, the "compliance storm event" exception from the ATS NELs remain in effect. See Section K of this Fact Sheet, and Attachment F of this General Permit for more information.

a. TMDLs and Waste Load Allocations

Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL for sediment has been adopted by the Regional Water Board or USEPA, must comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of sediment. If it does, the

TMDL should include a specific waste load allocation for this activity/source. The discharger, in this case, may be required by a separate Regional Water Board order to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. If a specific waste load allocation has been established that would apply to a specific discharge, the Regional Water Board may adopt an order requiring specific implementation actions necessary to meet that allocation. In the instance where an approved TMDL has specified a general waste load allocation to construction storm water discharges, but no specific requirements for construction sites have been identified in the TMDL, dischargers must consult with the state TMDL authority[9] to confirm that adherence to a SWPPP that meets the requirements of the General Permit will be consistent with the approved TMDL.

2. Determining Compliance with Effluent Standards

a. Technology-Based Numeric Action Levels (NALs)

This General Permit contains technology-based NALs for pH and turbidity, and requirements for effluent monitoring at all Risk level 2 & 3, and LUP Type 2 & 3 sites. Numeric action levels are essentially numeric benchmark values for certain parameters that, if exceeded in effluent sampling, trigger the discharger to take actions. Exceedance of an NAL does not itself constitute a violation of the General Permit. If the discharger fails to take the corrective action required by the General Permit, though, that may consititute a violation.

The primary purpose of NALs is to assist dischargers in evaluating the effectiveness of their on-site measures. Construction sites need to employ many different systems that must work together to achieve compliance with the permit's requirements. The NALs chosen should indicate whether the systems are working as intended.

Another purpose of NALs is to provide information regarding construction activities and water quality impacts. This data will provide the State and Regional Water Boards and the rest of the storm water community with more information about levels and types of pollutants present in runoff and how effective the dischargers BMPs are at reducing pollutants in effluent. The State Water Board also hopes to learn more about the linkage between effluent and receiving water quality. In addition, these requirements will provide information on the mechanics needed to establish compliance monitoring programs at construction sites in future permit deliberations.

i. *pH*

The chosen limits were established by calculating one standard deviation above and below the mean pH of runoff from highway construction sites[10] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.5 to 8.5 pH Units.

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[9] http://www.waterboards.ca.gov/tmdl/tmdl.html.
[10] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.

The Caltrans study included 33 highway construction sites throughout California over a period of four years, which included 120 storm events. All of these sites had BMPs in place that would be generally implemented at all types of construction sites in California.

ii. *Turbidity*

BPJ was used to develop an NAL that can be used as a learning tool to help dischargers improve their site controls, and to provide meaningful information on the effectiveness of storm water controls. A statewide turbidity NAL has been set at 250 NTU.

G. Receiving Water Limitations

Construction-related activities that cause or contribute to an exceedance of water quality standards must be addressed. The dynamic nature of construction activity gives the discharger the ability to quickly identify and monitor the source of the exceedances. This is because when storm water mobilizes sediment, it provides visual cues as to where corrective actions should take place and how effective they are once implemented.

This General Permit requires that storm water discharges and authorized non-storm water discharges must not contain pollutants that cause or contribute to an exceedance of any applicable water quality objective or water quality standards. The monitoring requirements in this General Permit for sampling and analysis procedures will help determine whether BMPs installed and maintained are preventing pollutants in discharges from the construction site that may cause or contribute to an exceedance of water quality standards.

Water quality standards consist of designated beneficial uses of surface waters and the adoption of ambient criteria necessary to protect those uses. When adopted by the State Water Board or a Regional Water Board, the ambient criteria are termed “water quality objectives.” If storm water runoff from construction sites contains pollutants, there is a risk that those pollutants could enter surface waters and cause or contribute to an exceedance of water quality standards. For that reason, dischargers should be aware of the applicable water quality standards in their receiving waters. (The best method to ensure compliance with receiving water limitations is to implement BMPs that prevent pollutants from contact with storm water or from leaving the construction site in runoff.)

In California, water quality standards are published in the Basin Plans adopted by each Regional Water Board, the California Toxics Rule (CTR), the National Toxics Rule (NTR), and the Ocean Plan.

Dischargers can determine the applicable water quality standards by contacting Regional Water Board staff or by consulting one of the following sources. The actual Basin Plans that contain the water quality standards can be viewed at the website of the appropriate Regional Water Board. (http://www.waterboards.ca.gov/regions.html), the State Water Board site for statewide plans (http://www.waterboards.ca.gov/plnspols/index.html), or the USEPA regulations for the NTR and CTR (40 C.F.R. §§ 131.36-38). Basin Plans and statewide plans are also available by mail from the appropriate Regional Water Board or the State Water Board. The USEPA regulations are available at http://www.epa.gov/. Additional information concerning water quality standards can be accessed through http://www.waterboards.ca.gov/stormwtr/gen_const.html.

H. Training Qualifications and Requirements

The Blue Ribbon Panel (BRP) made the following observation about the lack of industry-specific training requirements:

“Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors.”

Order 99-08-DWQ required that all dischargers train their employees on how to comply with the permit, but it did not specificy a curriculum or certification program. This has resulted in inconsistent implementation by all affected parties - the dischargers, the local governments where the construction activity occurs, and the regulators required to enforce 99-08-DWQ. This General Permit requires Qualified SWPPP Developers and practitioners to obtain appropriate training, and makes this curriculum mandatory two years after adoption, to allow time for course completion. The State and Regional Water Board are working with many stakeholders to develop the curriculum and mechanisms needed to develop and deliver the courses.

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, the Qualified SWPPP Developer and Qualified SWPPP Practitioners responsible for creating, revising, overseeing, and implementing the SWPPP must attend a State Water Board-sponsored or approved Qualified SWPPP Developer and Qualified SWPPP Practitioner training course.

I. Sampling, Monitoring, Reporting and Record Keeping

1. Traditional Construction Monitoring Requirements

This General Permit requires visual monitoring at all sites, and effluent water quality at all Risk Level 2 & 3 sites. It requires receiving water monitoring at some Risk Level 3 sites. All sites are required to submit annual reports, which contain various types of information, depending on the site characteristics and events. A summary of the monitoring and reporting requirements is found in Table 4.

Table 4 - Required Monitoring Elements for Risk Levels

	Visual	Non-visible Pollutant	Effluent	Receiving Water
Risk Level 1	three types required for all Risk Levels: non-storm water, pre-rain and post-rain	As needed for all Risk Levels (see below)	where applicable	not required
Risk Level 2			pH, turbidity	not required
Risk Level 3			pH, turbidity	(if Receiving Water Monitoring Trigger exceeded) pH, turbidity and SSC. Bioassessment for sites 30 acres or larger.

a. Visual

All dischargers are required to conduct quarterly, non-storm water visual inspections. For these inspections, the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources. For storm-related inspections, dischargers must visually observe storm water discharges at all discharge locations within two business days after a qualifying event. For this requirement, a qualifying rain event is one producing precipitation of ½ inch or more of discharge. Dischargers must conduct a post-storm event inspection to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify any additional BMPs necessary and revise the SWPPP accordingly. Dischargers must maintain on-site records of all visual observations, personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

b. Non-Visible Pollutant Monitoring

This General Permit requires that all dischargers develop a sampling and analysis strategy for monitoring pollutants that are not visually detectable in storm water. Monitoring for non-visible pollutants must be required at any construction site when the exposure of construction materials occurs and where a discharge can cause or contribute to an exceedance of a water quality objective.

Of significant concern for construction discharges are the pollutants found in materials used in large quantities at construction sites throughout California and exposed throughout the rainy season, such as cement, flyash, and other recycled materials or by-products of combustion. The water quality standards that apply to these materials will depend on their composition. Some of the more common storm water pollutants from construction activity are not CTR pollutants. Examples of non-visible pollutants include glyphosate (herbicides), diazinon and chlorpyrifos (pesticides), nutrients (fertilizers), and molybdenum (lubricants). The use of diazinon and chlorpyrifos is a common practice among landscaping professionals and may trigger sampling and analysis requirements if these materials come into contact with storm water. High pH values from cement and gypsum, high pH and SSC from wash waters, and chemical/fecal contamination from portable toilets, also are not CTR pollutants. Although some of these constituents do have numeric water quality objectives in individual Basin Plans, many do not and are subject only to narrative water quality standards (i.e. not causing toxicity). Dischargers are encouraged to discuss these issues with Regional Water Board staff and other storm water quality professionals.

The most effective way to avoid the sampling and analysis requirements, and to ensure permit compliance, is to avoid the exposure of construction materials to precipitation and storm water runoff. Materials that are not exposed do not have the potential to enter storm water runoff, and therefore receiving waters sampling is not required. Preventing contact between storm water and construction materials is one of the most important BMPs at any construction site.

Preventing or eliminating the exposure of pollutants at construction sites is not always possible. Some materials, such as soil amendments, are designed to be used in a manner that will result in exposure to storm water. In these cases, it is important to make sure that these materials are applied according to the manufacturer's instructions and at a time when they are unlikely to be washed away. Other construction materials can be exposed when storage, waste disposal or the application of the material is done in a manner not protective of water quality. For these situations, sampling is required unless there is capture and containment of all storm water that has been exposed. In cases where construction materials may be exposed to storm water, but the storm water is contained and is not allowed to run off the site, sampling will only be required when inspections show that the containment failed or is breached, resulting in potential exposure or discharge to receiving waters.

The discharger must develop a list of potential pollutants based on a review of potential sources, which will include construction materials soil amendments, soil treatments, and historic contamination at the site. The discharger must review existing environmental and real estate documentation to determine the potential for pollutants that could be present on the construction site as a result of past land use activities.

Good sources of information on previously existing pollution and past land uses include:

i. Environmental Assessments;

ii. Initial Studies;

iii. Phase 1 Assessments prepared for property transfers; and

iv. Environmental Impact Reports or Environmental Impact Statements prepared under the requirements of the National Environmental Policy Act or the California Environmental Quality Act.

In some instances, the results of soil chemical analyses may be available and can provide additional information on potential contamination.

The potential pollutant list must include all non-visible pollutants that are known or should be known to occur on the construction site including, but not limited to, materials that:

i. are being used in construction activities;

ii. are stored on the construction site;

iii. were spilled during construction operations and not cleaned up;

iv. were stored (or used) in a manner that created the potential for a release of the materials during past land use activities;

v. were spilled during previous land use activities and not cleaned up; or

vi. were applied to the soil as part of past land use activities.

C. Effluent Monitoring

Federal regulations[11] require effluent monitoring for discharges subject to NALs. Subsequently, all Risk Level 2 and 3 dischargers must perform sampling and analysis of effluent discharges to characterize discharges associated with construction activity from the entire area disturbed by the project. Dischargers must collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

Table 5 - Storm Water Effluent Monitoring Requirements by Risk Level

	Frequency	Effluent Monitoring (Section E, below)
Risk Level 1	when applicable	non-visible pollutant parameters (if applicable)
Risk Level 2	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	pH, turbidity, and non-visible pollutant parameters (if applicable)
Risk Level 3	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	pH, turbidity, and non-visible pollutant parameters if applicable

Risk Level 1 dischargers must analyze samples for:

i. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment C contained in the General Permit.

[11] 40 C.F.R. § 122.44.

Risk Level 2 dischargers must analyze samples for:

i. pH and turbidity;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment D contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

Risk Level 3 dischargers must analyze samples for:

i. pH, turbidity;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment E contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

2. Linear Monitoring and Sampling Requirements

Attachment A, establishes minimum monitoring and reporting requirements for all LUPs. It establishes different monitoring requirements depending on project complexity and risk to water quality. The monitoring requirements for Type 1 LUPs are less than Type 2 & 3 projects because Type 1 projects have a lower potential to impact water quality.

A discharger shall prepare a monitoring program prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project.

a. Type 1 LUP Monitoring Requirements

A discharger must conduct daily visual inspections of Type 1 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be conducted in conjunction with other daily activities. Inspections will be conducted to ensure the BMPs are adequate, maintained, and in place at the end of the construction day. The discharger will revise the SWPPP, as appropriate, based on the results of the daily inspections. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures have been installed, and successful final vegetative cover or other stabilization criteria have been met).

A discharger shall implement the monitoring program for inspecting Type 1 LUPs. This program requires temporary and permanent stabilization BMPs after active construction is completed. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where re-vegetation is chosen until minimum vegetative coverage has been established. Photographs shall be taken during site inspections and submitted to the State Water Board.

b. Type 2 & 3 LUP Monitoring Requirements

A discharger must conduct daily visual inspections of Type 2 & 3 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be in conjunction with other daily activities.

All dischargers of Type 2 & 3 LUPs are required to conduct inspections by qualified personnel of the construction site during normal working hours prior to all anticipated storm events and after actual storm events. During extended storm events, the discharger shall conduct inspections during normal working hours for each 24-hour period. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures installed, and successful vegetative cover or other stabilization criteria have been met).

The goals of these inspections are (1) to identify areas contributing to a storm water discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate and properly installed and functioning in accordance with the terms of the General Permit; and (3) to determine whether additional control practices or corrective maintenance activities are needed. Equipment, materials, and workers must be available for rapid response to failures and emergencies. All corrective maintenance to BMPs shall be performed as soon as possible, depending upon worker safety.

All dischargers shall develop and implement a monitoring program for inspecting Type 2 & 3 LUPs that require temporary and permanent stabilization BMPs after active construction is completed. Inspections will be conducted to ensure the BMPs are adequate and maintained. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where revegetation is chosen until minimum vegetative coverage has been established.

A log of inspections conducted before, during, and after the storm events must be maintained in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection. Photographs must be taken during site inspections and submitted to the State Water Board.

C. Sampling Requirements for all LUP Project Types

LUPs are also subject to sampling and analysis requirements for visible pollutants (i.e., sedimentation/siltation, turbidity) and for non-visible pollutants.

Sampling for visible pollutants is required for Type 2 & 3 LUPs.

Non-visible pollutant monitoring is required for pollutants associated with construction sites and activities that (1) are not visually detectable in storm water discharges, and (2) are known or should be known to occur on the construction site, and (3) could cause or contribute to an exceedance of water quality objectives in the receiving waters. Sample collection for non-visible pollutants must only be required (1) during a storm event when pollutants associated with construction activities may be discharged with storm water runoff due to a spill, or in the event there was a breach, malfunction, failure, and/or leak of any BMP, and (2) when the discharger has failed to adequately clean the area of material and pollutants. Failure to implement appropriate BMPs will trigger the same sampling requirements as those required for a breach, malfunction and/or leak, or when the discharger has failed to implement appropriate BMPs prior to the next storm event.

Additional monitoring parameters may be required by the Regional Water Boards.

It is not anticipated that many LUPs will be required to collect samples for pollutants not visually detected in runoff due to the nature and character of the construction site and activities as previously described in this fact sheet. Most LUPs are constructed in urban areas with public access (e.g., existing roadways, road shoulders, parking areas, etc.). This raises a concern regarding the potential contribution of pollutants from vehicle use and/or from normal activities of the public (e.g., vehicle washing, landscape fertilization, pest spraying, etc.) in runoff from the project site. Since the dischargers are not the land owners of the project area and are not able to control the presence of these pollutants in the storm water that runs through their projects, it is not the intent of this General Permit to require dischargers to sample for these pollutants. This General Permit does not require the discharger to sample for these types of pollutants except where the discharger has brought materials onsite that contain these pollutants and when a condition (e.g., breach, failure, etc.) described above occurs.

3. Receiving Water Monitoring

In order to ensure that receiving water limitations are met, discharges subject to receiving water monitoring triggers (i.e., Risk Level 3 and LUP Type 3 sites) or numeric effluent limitations (i.e., Risk Level 3 and LUP Type 3 sites utilizing ATS with direct discharges into receiving waters) must also monitor the downstream receiving water(s) for turbidity, SSC, and pH (if applicable) when a receiving water monitoring trigger or NEL is exceeded.

a. Bioassessment Monitoring

This General Permit requires a bioassessment of receiving waters for dischargers of Risk Level 3 or LUP Type 3 construction projects equal to or larger than 30 acres with direct discharges into receiving waters. Benthic macroinvertebrate samples will be taken upstream and downstream of the site's discharge point in the receiving water. Bioassessments measure the quality of the stream by analyzing the aquatic life present. Higher levels of appropriate aquatic species tend to indicate a healthy stream; whereas low levels of organisms can indicate stream degradation. Active construction sites have the potential to discharge large amounts of sediment and pollutants into receiving waters. Requiring a bioassessment for large project sites, with the most potential to impact water quality, provides a snapshot of the health of the receiving water prior to initiation of construction activities. This snapshot can be used in comparison to the health of the receiving water after construction has commenced.

Each ecoregion (biologically and geographically related area) in the State has a specific yearly peak time where stream biota is in a stable and abundant state. This time of year is called an Index Period. The bioassessment requirements in this General Permit, requires benthic macroinvertebrate sampling within a sites index period. The State Water Board has developed a map designating index periods for the ecoregions in the State (see State Water Board Website).

This General Permit requires the bioassessment methods to be in accordance with the Surface Water Ambient Monitoring Program (SWAMP) in order to provide data consistency within the state as well as generate useable biological stream data.

Table 6 - Receiving Water Monitoring Requirements

	Receiving Water Monitoring Parameters
Risk Level 1 /LUP Type 1	not required
Risk Level 2 / LUP Type 2	not required
Risk Level 3 / LUP Type 3	If Receiving Water Monitoring Trigger exceeded: pH (if applicable), turbidity, and SSC. Bioassessment for sites 30 acres or larger.

4. Reporting Requirements

a. NAL Exceedance Report

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State And Regional Boards, via the electronic data system, no later than 10 days after the conclusion of the storm event.

b. Annual Report

All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System (SMARTS). The

Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.

5. Record Keeping

According to 40 C.F.R. Parts 122.21(p) and 122.41(j), the discharger is required to retain paper or electronic copies of all records required by this General Permit for a period of at least three years from the date generated or the date submitted to the State Water Board or Regional Water Boards. A discharger must retain records for a period beyond three years as directed by Regional Water Board.

J. Risk Determination

1. Traditional Projects

a. Overall Risk Determination

There are two major requirements related to site planning and risk determination in this General Permit. The project's overall risk is broken up into two elements – (1) project sediment risk (the relative amount of sediment that can be discharged, given the project and location details) and (2) receiving water risk (the risk sediment discharges pose to the receiving waters).

Project Sediment Risk:
Project Sediment Risk is determined by multiplying the R, K, and LS factors from the Revised Universal Soil Loss Equation (RUSLE) to obtain an estimate of project-related bare ground soil loss expressed in tons/acre. The RUSLE equation is as follows:

A = (R)(K)(LS)(C)(P)

Where: A = the rate of sheet and rill erosion
R = rainfall-runoff erosivity factor
K = soil erodibility factor
LS = length-slope factor
C = cover factor (erosion controls)
P = management operations and support practices (sediment controls)

The C and P factors are given values of 1.0 to simulate bare ground conditions.

There is a map option and a manual calculation option for determining soil loss. For the map option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The product of K and LS are shown on Figure 1. To determine soil loss in tons per acre, the discharger multiplies the R factor times the value for K times LS from the map.

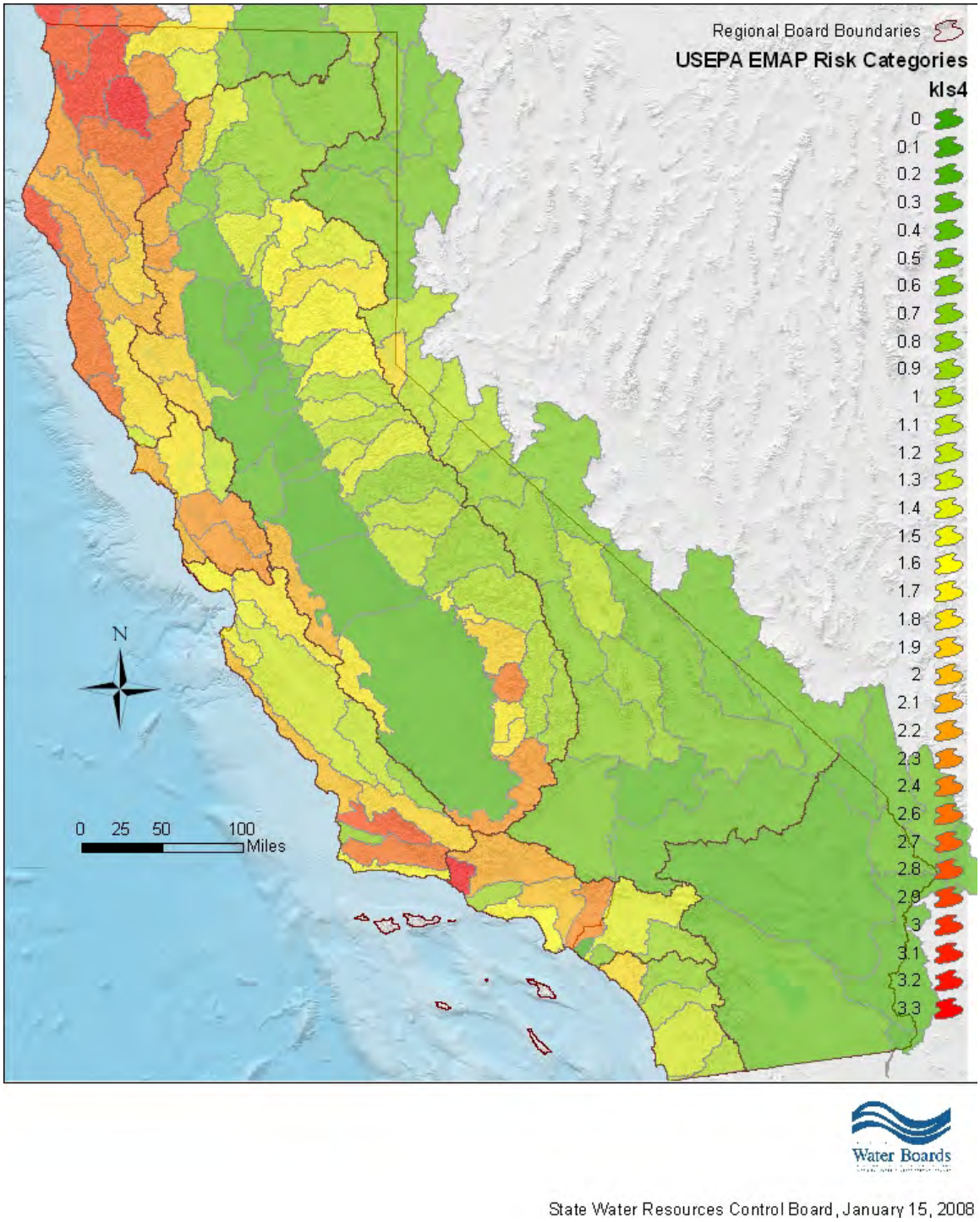

Figure 1 -Statewide Map of K * LS

For the manual calculation option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The K and LS factors are determined using Appendix 1.

Soil loss of less than 15 tons/acre is considered **low** sediment risk.
Soil loss between 15 and 75 tons/acre is **medium** sediment risk.
Soil loss over 75 tons/acre is considered **high** sediment risk.

The soil loss values and risk categories were obtained from mean and standard deviation RKLS values from the USEPA EMAP program. High risk is the mean RKLS value plus two standard deviations. Low risk is the mean RKLS value minus two standard deviations.

Receiving Water Risk:
Receiving water risk is based on whether a project drains to a sediment-sensitive waterbody. A sediment-sensitive waterbody is either

on the most recent 303d list for waterbodies impaired for sediment;
has a USEPA-approved Total Maximum Daily Load implementation plan for sediment; **or**
has the beneficial uses of COLD, SPAWN, and MIGRATORY.

A project that meets at least one of the three criteria has a high receiving water risk. A list of sediment-sensitive waterbodies will be posted on the State Water Board's website. It is anticipated that an interactive map of sediment sensitive water bodies in California will be available in the future.

The Risk Levels have been altered by eliminating the possibility of a Risk Level 4, and expanding the constraints for Risk Levels 1, 2, and 3. Therefore, projects with high receiving water risk and high sediment risk will be considered a Risk Level 3 risk to water quality.

In response to public comments, the Risk Level requirements have also been changed such that Risk Level 1 projects will be subject to minimum BMP and visual monitoring requirements, Risk Level 2 projects will be subject to NALs and some additional monitoring requirements, and Risk Level 3 projects will be subject to NALs, and more rigorous monitoring requirements such as receiving water monitoring and in some cases bioassessment.

Table 7 - Combined Risk Level Matrix

Combined Risk Level Matrix				
Receiving Water Risk		Sediment Risk		
		Low	Medium	High
	Low	Level 1	Level 2	
	High	Level 2		Level 3

b. Effluent Standards

All dischargers are subject to the narrative effluent limitations specified in the General Permit. The narrative effluent limitations require storm water discharges associated with construction activity to meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutants and any more stringent controls necessary to meet water quality standards.

Risk Level 2 dischargers that pose a medium risk to water quality are subject to technology-based NALs for pH and turbidity. Risk Level 3 dischargers that pose a high risk to water quality are also subject to technology-based NALs for pH and turbidity.

c. Good Housekeeping

Proper handling and managing of construction materials can help minimize threats to water quality. The discharger must consider good housekeeping measures for: construction materials, waste management, vehicle storage & maintenance, landscape materials, and potential pollutant sources. Examples include; conducting an inventory of products used, implementing proper storage & containment, and properly cleaning all leaks from equipment and vehicles.

d. Non-Storm Water Management

Non-storm water discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-storm water discharges during construction, and from dewatering activities associated with construction. Examples include; properly washing vehicles in contained areas, cleaning streets, and minimizing irrigation runoff.

e. Erosion Control

The best way to minimize the risk of creating erosion and sedimentation problems during construction is to disturb as little of the land surface as possible by fitting the development to the terrain. When development is tailored to the natural contours of the land, little grading is necessary and, consequently, erosion potential is lower.[14] Other effective erosion control measures include: preserving existing vegetation where feasible, limiting disturbance, and stabilizing and re-vegetating disturbed areas as soon as possible after grading or construction activities. Particular attention must be paid to large, mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single most important factor in reducing erosion at construction sites. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. These erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing storm water contamination, and sediment control techniques should be used to capture any soil that becomes eroded.[12]

Risk Level 3 dischargers pose a higher risk to water quality and are therefore additionally required to ensure that post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Sediment Control

Sediment control BMPs should be the secondary means of preventing storm water contamination. When erosion control techniques are ineffective, sediment control techniques should be used to capture any soil that becomes eroded. The discharger is required to consider perimeter control measures such as: installing silt fences or placing straw wattles below slopes. These sediment control measures are only

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[12] U.S. Environmental Protection Agency. 2007. Developing Your Storm Water Pollution Prevention Plan: A Guide for Construction Sites.

examples of what should be considered and should not preclude new or innovative approaches currently available or being developed.

Because Risk Level 2 and 3 dischargers pose a higher risk to water quality, additional requirements for the application of sediment controls are imposed on these projects. This General Permit also authorizes the Regional Water Boards to require Risk Level 3 dischargers to implement additional site-specific sediment control requirements if the implementation of other erosion or sediment controls are not adequately protecting the receiving waters.

g. Run-on and Runoff Control

Inappropriate management of run-on and runoff can result in excessive physical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include: installing berms and other temporary run-on and runoff diversions.

Risk Level 1 dischargers with lower risks to impact water quality are not subject to the run-on and runoff control requirements unless an evaluation deems them necessary or visual inspections show that such controls are required.

h. Inspection, Maintenance and Repair

All measures must be periodically inspected, maintained and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended.

i. Rain Event Action Plan (REAP)

A Rain Event Action Plan (REAP) is a written document, specific for each rain event. A REAP should be designed that when implemented it protects all exposed portions of the site within 48 hours of any likely precipitation event forecast of 50% or greater probability.

This General Permit requires Risk Level 2 and 3 dischargers to develop and implement a REAP designed to protect all exposed portions of their sites within 48 hours prior to any likely precipitation event. The REAP requirement is designed to ensure that the discharger has adequate materials, staff, and time to implement erosion and sediment control measures that are intended to reduce the amount of sediment and other pollutants generated from the active site. A REAP must be developed when there is likely a forecast of 50% or greater probability of precipitation in the project area. (The National Oceanic and Atmospheric Administration (NOAA) defines a chance of precipitation as a probability of precipitation of 30% to 50% chance of producing precipitation in the project area.[13] NOAA defines the probability of precipitation (PoP) as the likelihood of occurrence (expressed as a percent) of a measurable amount (0.01 inch or more) of liquid precipitation (or the water equivalent of frozen precipitation) during a specified period of time at any given point in the forecast area.) Forecasts are normally issued for 12-hour time periods. Descriptive terms for uncertainty and aerial coverage are used as follows:

Table 8 -National Oceanic and Atmospheric Administration (NOAA) Definition of Probability of Precipitation (PoP)

[13] http://www.crh.noaa.gov/lot/severe/wxterms.php.

PoP	Expressions of Uncertainty	Aerial Coverage
0%	none used	none used
10%	none used	isolated
20%	slight chance	isolated
30-50%	chance	scattered
60-70%	likely	numerous
80-100%	none used	none used

The discharger must obtain the precipitation forecast information from the National Weather Service Forecast Office (http://www.srh.noaa.gov/).

2. Linear Projects

a. Linear Risk Determination

LUPs vary in complexity and water quality concerns based on the type of project. This General Permit has varying application requirements based on the project's risk to water quality. Factors that lead to the characterization of the project include location, sediment risk, and receiving water risk.

Based on the location and complexity of a project area or project section area, LUPs are separated into project types. As described below, LUPs have been categorized into three project types.

i. *Type 1 LUPs*

Type 1 LUPs are those construction projects where:

(1) 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day, or

(2) greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

Areas disturbed during construction will be returned to pre-construction conditions or equivalent protection established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization Best Management Practices (BMPs) will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

Type 1 LUPs typically do not have a high potential to impact storm water quality because (1) these construction activities are not typically conducted during a rain event, (2) these projects are normally constructed over a short period of time[14], minimizing the duration that pollutants could potentially be exposed to rainfall; and (3) disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.

Type 1 LUPs are determined during the risk assessment found in Attachment A.1 to be 1) low sediment risk and low receiving water risk; 2) low sediment risk and medium receiving water risk; and 3) medium sediment risk and low receiving water risk.

This General Permit requires the discharger to ensure a SWPPP is developed for these construction activities that is specific to project type, location and characteristics.

ii. ***Type 2 LUPs:***

Type 2 projects are determined to have a combination of High, Medium, and Low project sediment risk along with High, Medium, and Low receiving water risk. Like Type 1 projects, Type 2 projects are typically constructed over a short period of time. However, these projects have a higher potential to impact water quality because they:

(1) typically occur outside the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location and characteristics.

iii. ***Type 3 LUPs:***

[14] Short period of time refers to a project duration of weeks to months, but typically less than one year in duration.

Type 3 projects are determined to have a combination of High and Medium project sediment risk along with High and Medium receiving water risk. Similar to Type 2 projects, Type 3 projects have a higher potential to impact water quality because they:

(1) typically occur outside of the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location, and characteristics.

b. Linear Effluent Standards

All LUPs are subject to the narrative effluent limitations specified in the General Permit.

Type 2 and Type 3 projects are subject to technology-based NALs for pH and turbidity.

c. Linear Good Housekeeping

Improper use and handling of construction materials could potentially cause a threat to water quality. In order to ensure proper site management of these construction materials, all LUP dischargers must comply with a minimum set of Good Housekeeping measures specified in Attachment A of this General Permit.

d. Linear Non-Storm Water Management

In order to ensure control of all non-storm water discharges during construction, all LUP dischargers must comply with the Non-Storm Water Management measures specified in Attachment A of this General Permit.

e. Linear Erosion Control

This General Permit requires all LUP dischargers to implement effective wind erosion control measures, and soil cover for inactive areas. Type 3 LUPs posing a higher risk to water quality are additionally required to ensure the post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Linear Sediment Control

In order to ensure control and containment of all sediment discharges, all LUP dischargers must comply with the general Sediment Control measures specified in Attachment A or this General Permit. Additional requirements for sediment controls are imposed on Type 2 & 3 LUPs due to their higher risk to water quality.

g. Linear Run-on and Runoff Control

Discharges originating outside of a project's perimeter and flowing onto the property can adversely affect the quantity and quality of discharges originating from a project site. In order to ensure proper management of run-on and runoff, all LUPs must comply with the run-on and runoff control measures specified in Attachment A of this General Permit. Due to the lower risk of impacting water quality, Type 1 LUPs are not required to implement run-on and runoff controls unless deemed necessary by the discharger.

h. Linear Inspection, Maintenance and Repair

Proper inspection, maintenance, and repair activities are important to ensure the effectiveness of on-site measures to control water quality. In order to ensure that inspection, maintenance, and repair activities are adequately performed, the all LUP dischargers a re required to comply with the Inspection, Maintenance, and Repair requirements specified in Attachment A of this General Permit.

K. ATS[15] Requirements

There are instances on construction sites where traditional erosion and sediment controls do not effectively control accelerated erosion. Under such circumstances, or under circumstances where storm water discharges leaving the site may cause or contribute to an exceedance of a water quality standard, the use of an Active Treatment System (ATS) may be necessary. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.[16]

Although treatment systems have been in use in some form since the mid-1990s, the ATS industry in California is relatively young, and detailed regulatory standards have not yet been developed. Many developers are using these systems to treat storm water discharges from their construction sites. The new ATS requirements set forth in this General Permit are based on those in place for small wastewater treatment systems, ATS regulations from the Central Valley Regional Water Quality Control Board (September 2005 memorandum "2005/2006 Rainy Season – Monitoring Requirements for Storm Water Treatment Systems that Utilize Chemical Additives to Enhance Sedimentation"), the Construction Storm Water Program at the State of Washington's Department of Ecology, as well as recent advances in technology and knowledge of coagulant performance and aquatic safety.

The effective design of an ATS requires a detailed survey and analysis of site conditions. With proper planning, ATS performance can provide exceptional water quality discharge and prevent significant impacts to surface water quality, even under extreme environmental conditions.

These systems can be very effective in reducing the sediment in storm water runoff, but the systems that use additives/polymers to enhance sedimentation also pose a potential risk to water quality (e.g., operational failure, equipment failure, additive/polymer release, etc.). The State Water Board is concerned about the potential acute and chronic impacts that the polymers and other chemical additives may have on fish and aquatic organisms if released in sufficient quantities or concentrations. In addition

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[15] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation in order to reduce turbidity caused by fine suspended sediment.
[16] Pitt, R., S. Clark, and D. Lake. 2006. Construction Site Erosion and Sediment Controls: Planning, Design, and Performance. DEStech Publications. Lancaster, PA. 370pp.

to anecdotal evidence of polymer releases causing aquatic toxicity in California, the literature supports this concern.[17] For example, cationic polymers have been shown to bind with the negatively charged gills of fish, resulting in mechanical suffocation.[18] Due to the potential toxicity impacts, which may be caused by the release of additives/polymers into receiving waters, this General Permit establishes residual polymer monitoring and toxicity testing requirements have been established in this General Permit for discharges from construction sites that utilize an ATS in order to protect receiving water quality and beneficial uses.

The primary treatment process in an ATS is coagulation/flocculation. ATS's operate on the principle that the added coagulant is bound to suspended sediment, forming floc, which is gravitationally settled in tanks or a basin, or removed by sand filters. A typical installation utilizes an injection pump upstream from the clarifier tank, basin, or sand filters, which is electronically metered to both flow rate and suspended solids level of the influent, assuring a constant dose. The coagulant mixes and reacts with the influent, forming a dense floc. The floc may be removed by gravitational setting in a clarifier tank or basin, or by filtration. Water from the clarifier tank, basin, or sand filters may be routed through cartridge(s) and/or bag filters for final polishing. Vendor-specific systems use various methods of dose control, sediment/floc removal, filtration, etc., that are detailed in project-specific documentation. The particular coagulant/flocculant to be used for a given project is determined based on the water chemistry of the site because the coagulants are specific in their reactions with various types of sediments. Appropriate selection of dosage must be carefully matched to the characteristics of each site.

ATS's are operated in two differing modes, either Batch or Flow-Through. Batch treatment can be defined as Pump-Treat-Hold-Test-Release. In Batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. Batch treatment involves holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full. In Flow-Through treatment, water is pumped into the ATS directly from the runoff collection system or storm water holding pond, where it is treated and filtered as it flows through the system, and is then directly discharged. "Flow-Through Treatment" is also referred to as "Continuous Treatment."

1. Effluent Standards

This General Permit establishes NELs for discharges from construction sites that utilize an ATS. These systems lend themselves to NELs for turbidity and pH because of their known reliable treatment. Advanced systems have been in use in some form since the mid-1990s. An ATS is considered reliable, can consistently produce a discharge of less than 10 NTU, and has been used successfully at many sites in several states since 1995 to reduce turbidity to very low levels.[19]

This General Permit contains "compliance storm event" exceptions from the technology-based NELs for ATS discharges. The rationale is that technology-based requirements are developed assuming a certain design storm. In the case of ATS the industry-standard design storm is 10-year, 24-hour (as stated in

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[17] RomØen, K., B. Thu, and Ø. Evensen. 2002. Immersion delivery of plasmid DNA II. A study of the potentials of a chitosan based delivery system in rainbow trout (*Oncorhynchus mykiss*) fry. *Journal of Controlled Release* **85**: 215-225.

[18] Bullock, G., V. Blazer, S. Tsukuda, and S. Summerfelt. 2000. Toxicity of acidified chitosan for cultured rainbow trout (*Oncorhynchus mykiss*). *Aquaculture* **185**:273-280.

[19] Currier, B., G. Minton, R. Pitt, L. Roesner, K. Schiff, M. Stenstrom, E. Strassler, and E. Strecker. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.

Attachment F of this General Permit), so the compliance storm event has been established as the 10-year 24-hour event as well to provide consistency.

2. **Training**

Operator training is critical to the safe and efficient operation and maintenance of the ATS, and to ensure that all State Water Board monitoring and sampling requirements are met. The General Permit requires that all ATS operators have training specific to using ATS's liquid coagulants.

L. Post-Construction Requirements

Under past practices, new and redevelopment construction activities have resulted in modified natural watershed and stream processes. This is caused by altering the terrain, modifying the vegetation and soil characteristics, introducing impervious surfaces such as pavement and buildings, increasing drainage density through pipes and channels, and altering the condition of stream channels through straightening, deepening, and armoring. These changes result in a drainage system where sediment transport capacity is increased and sediment supply is decreased. A receiving channel's response is dependent on dominant channel materials and its stage of adjustment.

Construction activity can lead to impairment of beneficial uses in two main ways. First, during the actual construction process, storm water discharges can negatively affect the chemical, biological, and physical properties of downstream receiving waters. Due to the disturbance of the landscape, the most likely pollutant is sediment, however pH and other non-visible pollutants are also of great concern. Second, after most construction activities are completed at a construction site, the finished project may result in significant modification of the site's response to precipitation. New development and redevelopment projects have almost always resulted in permanent post-construction water quality impacts because more precipitation ends up as runoff and less precipitation is intercepted, evapotranspired, and infiltrated.

General Permit 99-08-DWQ required the SWPPP to include a description of all post-construction BMPs on a site and a maintenance schedule. An effective storm water management strategy must address the full suite of storm events (water quality, channel protection, overbank flood protection, extreme flood protection) (Figure 2).

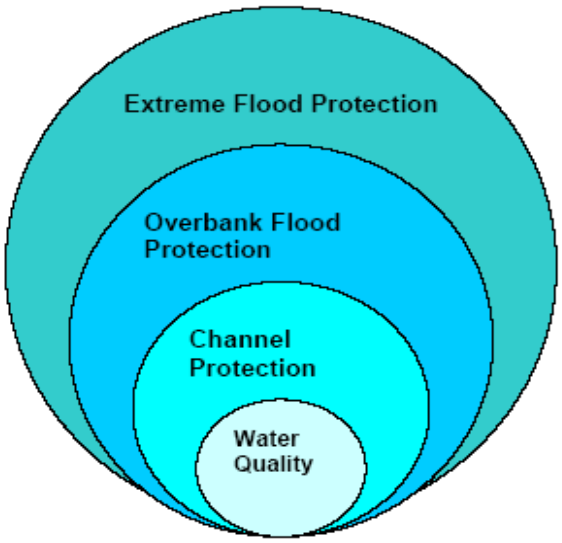

Figure 2 - Suite of Storm Events

The post-construction storm water performance standards in this General Permit specifically address water quality and channel protection events. Overbank flood protection and extreme flood protection events are traditionally dealt with in local drainage and flood protection ordinances. However, measures in this General Permit to address water quality and channel protection also reduce overbank and extreme flooding impacts. This General Permit aims to match post-construction runoff to pre-construction runoff for the 85th percentile storm event, which not only reduces the risk of impact to the receiving water's channel morphology but also provides some protection of water quality.

This General Permit clarifies that its runoff reduction requirements only apply to projects that lie outside of jurisdictions covered by a Standard Urban Storm water Management Plan (SUSMP) (or other more protective) post-construction requirements in either Phase I or Phase II permits.

Figures 3 and 4, below, show the General Permit enrollees (to Order 99-08-DWQ, as of March 10, 2008) overlaid upon a map with SUSMP (or more protective) areas in blue and purple. Areas without blue or purple indicate where the General Permit's runoff reduction requirements would actually apply.

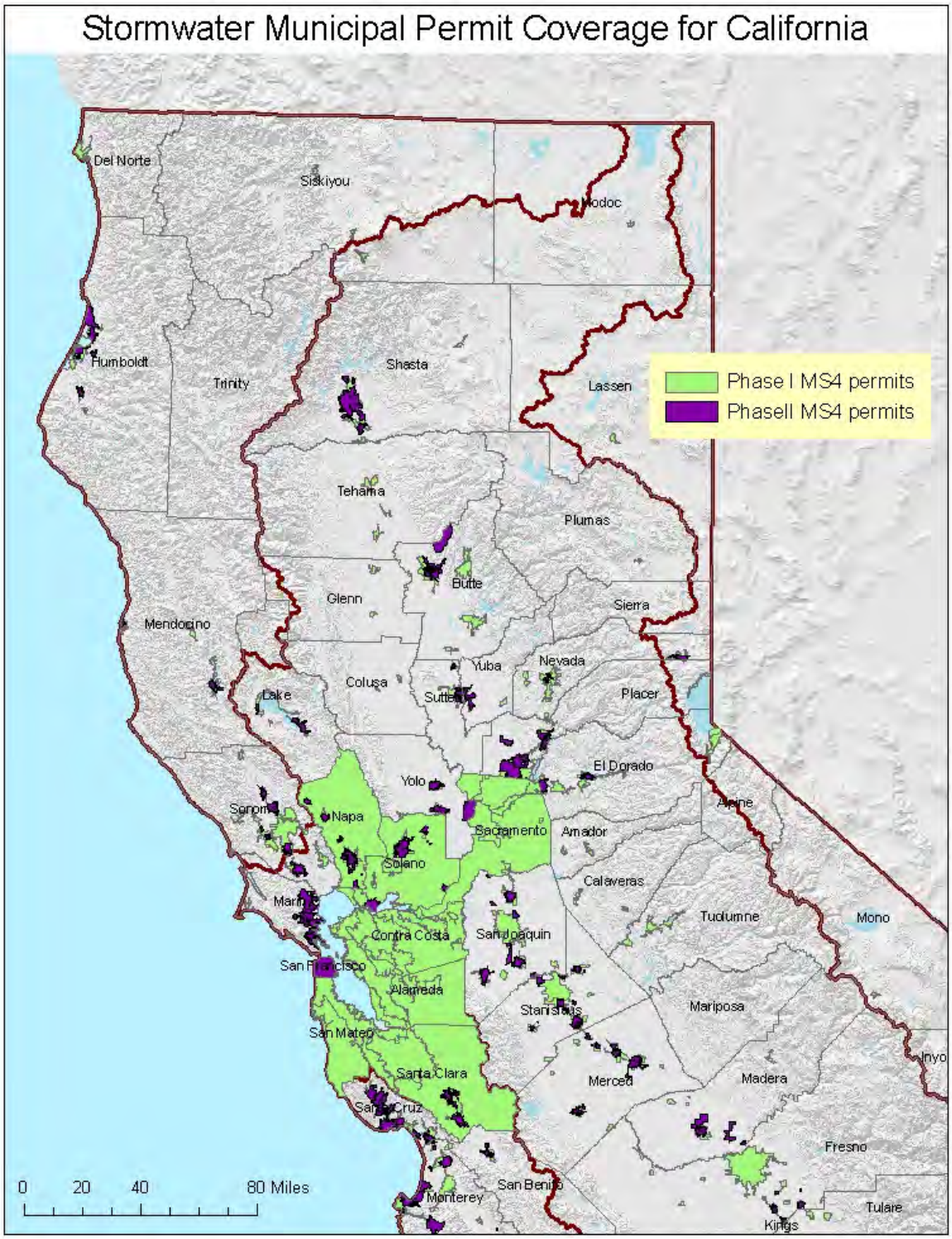

Figure 3 - Northern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Figure 4 - Southern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Water Quality:
This General Permit requires dischargers to replicate the pre-project runoff water balance (defined as the amount of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event, or the smallest storm event that generates runoff, whichever is larger. Contemporary storm water management generally routes these flows directly to the drainage system, increasing pollutant loads and potentially causing adverse effects on receiving waters. These smaller water quality events happen much more frequently than larger events and generate much higher pollutant loads on an annual basis. There are other adverse hydrological impacts that result from not designing according to the site's pre-construction water balance. In Maryland, Klein[20] noted that baseflow decreases as the extent of urbanization increases. Ferguson and Suckling[21] noted a similar relation in watersheds in Georgia. On Long Island, Spinello and Simmons[22] noted substantial decreases in base flow in intensely urbanized watersheds.

The permit emphasizes runoff reduction through on-site storm water reuse, interception, evapo-transpiration and infiltration through non-structural controls and conservation design measures (e.g., downspout disconnection, soil quality preservation/enhancement, interceptor trees). Employing these measures close to the source of runoff generation is the easiest and most cost-effective way to comply with the pre-construction water balance standard. Using low-tech runoff reduction techniques close to the source is consistent with a number of recommendations in the literature.[23] In many cases, BMPs implemented close to the source of runoff generation cost less than end-of the pipe measures.[24] Dischargers are given the option of using Appendix 2 to calculate the required runoff volume or a watershed process-based, continuous simulation model such as the EPA's Storm Water Management Model (SWMMM) or Hydrologic Simulation Program Fortran (HSPF). Such methods used by the discharger will be reviewed by the Regional Water Board upon NOT application.

Channel Protection:
In order to address channel protection, a basic understanding of fluvial geomorphic concepts is necessary. A dominant paradigm in fluvial geomorphology holds that streams adjust their channel dimensions (width and depth) in response to long-term changes in sediment supply and bankfull discharge (1.5 to 2 year recurrence interval). The bankfull stage corresponds to the discharge at which channel maintenance is the most effective, that is, the discharge at which the moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphologic characteristics of channels.[25] Lane (1955 as cited in Rosgen 1996[26]) showed the generalized relationship between sediment load, sediment size, stream discharge and stream slope in

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[20] Klein 1979 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[21] Ferguson and Suckling 1990 as cited Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[22] Center for Watershed Protection (CWP). 2000. The Practice of Watershed Protection: Techniques for protecting our nation's streams, lakes, rivers, and estuaries. Ellicott City, MD. 741 pp.
[23] Bay Area Storm Water Management Agencies Association (BASMAA). 1997. Start at the Source: Residential Site Planning and Design Guidance Manual for Storm Water Quality Protection. Palo Alto, CA;
McCuen, R.H. 2003 Smart Growth: hydrologic perspective. Journal of Professional Issues in Engineering Education and Practice. Vol (129), pp.151-154;
Moglen, G.E. and S. Kim. 2007. Impervious imperviousness-are threshold based policies a good idea? Journal of the American Planning Association, Vol 73 No. 2. pp 161-171.
[24] Delaware Department of natural Resources (DDNR). 2004. Green technology: The Delaware urban Runoff Management Approcah. Dover, DE. 117 pp.
[25] Dunne, T and L.B. Leopold. 1978. Water in Environmental Planning. San Francisco W.H. Freeman and Company
[26] Rosgen. D.L. 1996. Applied River Morphology. Pagosa Springs. Wildland Hydrology

Figure 5. A change in any one of these variables sets up a series of mutual adjustments in the companion variables with a resulting direct change in the physical characteristics of the stream channel.

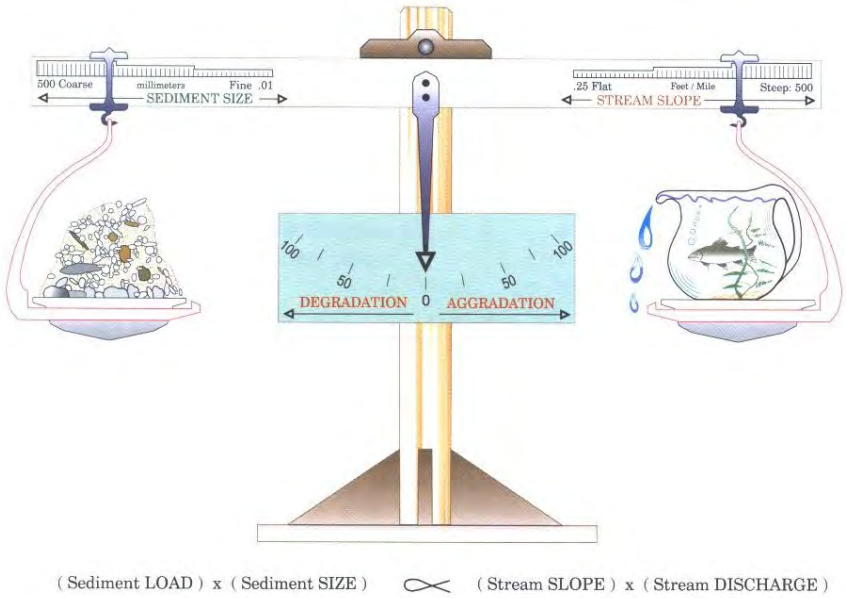

Figure 5 - Schematic of the Lane Relationship

After Lane (1955) as cited in Rosgen (1996)

Stream slope multiplied by stream discharge (the right side of the scale) is essentially an approximation of stream power, a unifying concept in fluvial geomorphology (Bledsoe 1999). Urbanization generally increases stream power and affects the resisting forces in a channel (sediment load and sediment size represented on the left side of the scale).

During construction, sediment loads can increase from 2 to 40,000 times over pre-construction levels.[27] Most of this sediment is delivered to stream channels during large, episodic rain events.[28] This increased sediment load leads to an initial aggradation phase where stream depths may decrease as sediment fills the channel, leading to a decrease in channel capacity and increase in flooding and overbank deposition. A degradation phase initiates after construction is completed.

Schumm et. al (1984) developed a channel evolution model that describes the series of adjustments from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 6).

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[27] Goldman S.J., K. Jackson, and T.A. Bursztynsky. 1986. Erosion and Sediment Control Handbook. McGraw Hill. San Francisco.

[28] Wolman 1967 as cited in Paul, M.P. and J.L. Meyer. 2001. Streams in the Urban Landscape. *Annu. Rev.Ecol. Syst.* 32: 333-365.

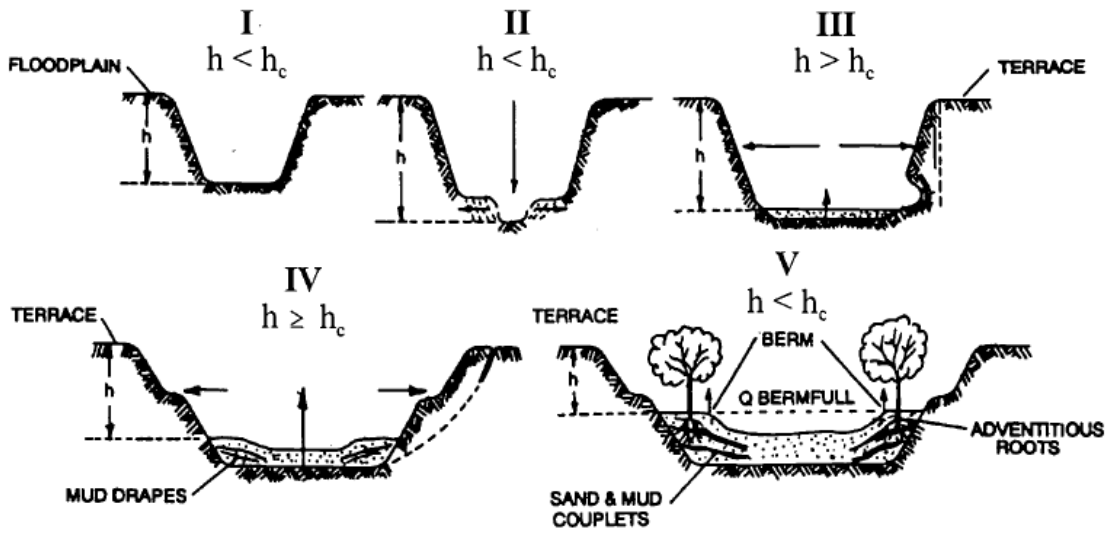

Figure 6 - Channel Changes Associated with Urbanization

After Incised Channel Evolution Sequence in Schumm et. al 1984

Channel incision (Stage II) and widening (Stages III and to a lesser degree, Stage IV) are due to a number of fundamental changes on the landscape. Connected impervious area and compaction of pervious surfaces increase the frequency and volume of bankfull discharges.[29] Increased drainage density (miles of stream length per square mile of watershed) also negatively impacts receiving stream channels.[30] Increased drainage density and hydraulic efficiency leads to an increase in the frequency and volume of bankfull discharges because the time of concentration is shortened. Flows from engineered pipes and channels are also often "sediment starved" and seek to replenish their sediment supply from the channel.

Encroachment of stream channels can also lead to an increase in stream slope, which leads to an increase in stream power. In addition, watershed sediment loads and sediment size (with size generally represented as the median bed and bank particle size, or d_{50}) decrease during urbanization.[31] This means

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[29] Booth, D. B. and C. R. Jackson. 1997. Urbanization of Aquatic Systems: Degradation Thresholds, Storm Water Detection, and the Limits of Mitigation. Journal of the American Water Resources Association Vol. 33, No.5, pp. 1077-1089.

[30] May, C.W. 1998. Cumulative effects of urbanization on small streams in the Puget Sound Lowland ecoregion. Conference proceedings from Puget Sound Research '98 held March 12, 13 1998 in Seattle, WA;
Santa Clara Valley Urban Runoff Pollution Prevention Program. 2002. Hydromodification Management Plan Literature Review. 80 pp.

[31] Finkenbine, J.K., D.S. Atwater, and D.S. Mavinic. 2000. Stream health after urbanization. *J. Am. Water Resour. Assoc.* 36:1149-60;

that even if pre- and post-development stream power are the same, more erosion will occur in the post-development stage because the smaller particles are less resistant (provided they are non-cohesive).

As shown in Stages II and III, the channel deepens and widens to accommodate the increased stream power [32]and decrease in sediment load and sediment size. Channels may actually narrow as entrained sediment from incision is deposited laterally in the channel. After incised channels begin to migrate laterally (Stage III), bank erosion begins, which leads to general channel widening.[33] At this point, a majority of the sediment that leaves a drainage area comes from within the channel, as opposed to the background and construction related hillslope contribution. Stage IV is characterized by more aggradation and localized bank instability. Stage V represents a new quasi-equilibrium channel morphology in balance with the new flow and sediment supply regime. In other words, stream power is in balance with sediment load and sediment size.

The magnitude of the channel morphology changes discussed above varies along a stream network as well as with the age of development, slope, geology (sand-bedded channels may cycle through the evolution sequence in a matter of decades whereas clay-dominated channels may take much longer), watershed sediment load and size, type of urbanization, and land use history. It is also dependent on a channel's stage in the channel evolution sequence when urbanization occurs. Management strategies

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Pizzuto, J.E. W.S. Hession, and M. McBride. 2000. Comparing gravel-bed rivers in paired urban and rural catchments of southeastern Pennsylvania. *Geology* 28:79-82.

[32] Hammer 1973 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp;
Booth, D.B. 1990. Stream Channel Incision Following Drainage Basin Urbanization. *Water Resour. Bull.* 26:407-417.

[33] Trimble, S.W. 1997. Contribution of Stream Channel Erosion to Sediment Yield from an Urbanizing Watershed. *Science*: Vol. 278 (21), pp. 1442-1444.

must take into account a channel's stage of adjustment and account for future changes in the evolution of channel form (Stein and Zaleski 2005).[34]

Traditional structural water quality BMPs (e.g. detention basins and other devices used to store volumes of runoff) unless they are highly engineered to provide adequate flow duration control, do not adequately protect receiving waters from accelerated channel bed and bank erosion, do not address post-development increases in runoff volume, and do not mitigate the decline in benthic macroinvertebrate communities in the receiving waters[35] suggest that structural BMPs are not as effective in protecting aquatic communities as a continuous riparian buffer of native vegetation. This is supported by the findings of Zucker and White[36], where instream biological metrics were correlated with the extent of forested buffers.

This General Permit requires dischargers to maintain pre-development drainage densities and times of concentration in order to protect channels and encourages dischargers to implement setbacks to reduce channel slope and velocity changes that can lead to aquatic habitat degradation.

There are a number of other approaches for modeling fluvial systems, including statistical and physical models and simpler stream power models.[37] The use of these models in California is described in Stein and Zaleski (2005).[38] Rather than prescribe a specific one-size-fits-all modeling method in this permit, the State Water Board intends to develop a stream power and channel evolution model-based framework to assess channels and develop a hierarchy of suitable analysis methods and management strategies. In time, this framework may become a State Water Board water quality control policy.

Permit Linkage to Overbank and Extreme Flood Protection
Site design BMPs (e.g. rooftop and impervious disconnection, vegetated swales, setbacks and buffers) filter and settle out pollutants and provide for more infiltration than is possible for traditional centralized structural BMPs placed at the lowest point in a site. They provide source control for runoff and lead to a reduction in pollutant loads. When implemented, they also help reduce the magnitude and volume of larger, less frequent storm events (e.g., 10-yr, 24-hour storm and larger), thereby reducing the need for expensive flood control infrastructure. Nonstructural BMPs can also be a landscape amenity, instead of a large isolated structure requiring substantial area for ancillary access, buffering, screening and maintenance facilities.[25] The multiple benefits of using non-structural benefits will be critically important as the state's population increases and imposes strains upon our existing water resources.

Maintaining predevelopment drainage densities and times of concentration will help reduce post-development peak flows and volumes in areas not covered under a municipal permit. The most effective way to preserve drainage areas and maximize time of concentration is to implement landform grading,

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[34] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.
[35] Horner, R.R. 2006. Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices (LID) for the San Diego Region. Available at: http://www.projectcleanwater.org/pdf/permit/case-study_lid.pdf.
[36] Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[37] Finlayson, D.P. and D.R. Montgomery. 2003. Modeling large-scale fluvial erosion in geographic information systems. Geomorphology (53), pp. 147-164).
[38] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.

incorporate site design BMPs and implement distributed structural BMPs (e.g., bioretention cells, rain gardens, rain cisterns).

M. Storm Water Pollution Prevention Plans

USEPA's Construction General Permit requires that qualified personnel conduct inspections. USEPA defines qualified personnel as "a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity."[39] USEPA also suggests that qualified personnel prepare SWPPPs and points to numerous states that require certified professionals to be on construction sites at all times. States that currently have certification programs are Washington, Georgia, Florida, Delaware, Maryland, and New Jersey. The Permit 99-08-DWQ did not require that qualified personnel prepare SWPPPs or conduct inspections. However, to ensure that water quality is being protected, this General Permit requires that all SWPPPs be written, amended, and certified by a Qualified SWPPP Developer. A Qualified SWPPP Developer must possess one of the eight certifications and or registrations specified in this General Permit and effective two years after the adoption date of this General Permit, must have attended a State Water Board-sponsored or approved Qualified SWPPP Developer training course. Table 9 provides an overview of the criteria used in determining qualified certification titles for a QSD and QSP.

39 US Environmental Protection Agency. Stormwater Pollution Prevention Plans for Construction Activities. <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm> and <http://www.epa.gov/npdes/pubs/sw_swppp_guide.pdf>.

Table 9 - Qualified SWPPP Developer/ Qualified SWPPP Practitioner Certification Criteria

Certification/ Title	Registered By	QSD/QSP	Certification Criteria
Professional Civil Engineer	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Geologist or Engineering Geologist	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Landscape Architect	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Hydrologist	American Institute of Hydrology	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Certified Professional in Erosion and Sediment Control™ (CPESC)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Inspector of Sediment and Erosion Control™ (CISEC)	Certified Inspector of Sediment and Erosion Control, Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Erosion, Sediment and Storm Water Inspector™ (CESSWI)	Enviro Cert International Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Professional in Storm Water Quality™ (CPSWQ)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education

The previous versions of the General Permit required development and implementation of a SWPPP as the primary compliance mechanism. The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of storm water discharges; and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water and non-storm water discharges. The SWPPP must include BMPs that address source control, BMPs that address pollutant control, and BMPs that address treatment control.

This General Permit shifts some of the measures that were covered by this general requirement to specific permit requirements, each individually enforceable as a permit term. This General Permit emphasizes the use of appropriately selected, correctly installed and maintained pollution reduction BMPs. This approach provides the flexibility necessary to establish BMPs that can effectively address source control of pollutants during changing construction activities. These specific requirements also improve both the clarity and the enforceability of the General Permit so that the dischargers understand, and the public can determine whether the discharges are in compliance with, permit requirements.

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the General Permit. For LUPs the discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio or telephone. Once construction activities are complete, until stabilization is achieved, the SWPPP shall be available from the SWPPP contact listed in the PRDs

A SWPPP must be appropriate for the type and complexity of a project and will be developed and implemented to address project specific conditions. Some projects may have similarities or complexities, yet each project is unique in its progressive state that requires specific description and selection of BMPs needed to address all possible generated pollutants

N. Regional Water Board Authorities

Because this General Permit will be issued to thousands of construction sites across the State, the Regional Water Boards retain discretionary authority over certain issues that may arise from the discharges in their respective regions. This General Permit does not grant the Regional Water Boards any authority they do not otherwise have; rather, it merely emphasizes that the Regional Water Boards can take specific actions related to this General Permit. For example, the Regional Water Boards will be enforcing this General Permit and may need to adjust some requirements for a discharger based on the discharger's compliance history.

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality
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Arnold Schwarzenegger
Governor

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ [as amended by Order No. 2010-0014-DWQ] except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

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Arnold Schwarzenegger
Governor

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2010-0014-DWQ
NPDES NO. CAS000002

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2009-0009-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ, was adopted by the State Water Resources Control Board on:	**November 16, 2010**
This Order shall become effective on:	**February 14, 2011**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-0009-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on **November 16, 2010.**

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2012-0006-DWQ
NPDES NO**. CAS000002**

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2010-0014-DWQ became effective on:	**February 14, 2011**
Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ, was adopted by the State Water Resources Control Board on:	**July 17, 2012**
This Order No. 2012-0006-DWQ shall become effective on:	**July 17, 2012**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-000-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on July 17, 2012.

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Tam M. Doduc
Board Member Steven Moore
Board Member Felicia Marcus

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

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STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2009-0009-DWQ
[AS AMENDED BY ORDER NO. 2010-0014-DWQ]
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH
CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

I. FINDINGS

A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.

2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear

Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.

4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.

5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.

6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16,[1] which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.

7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.

8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.

9. Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

[1] Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.

11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.

12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.

13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.

14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.

15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.

16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.

17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

B. Activities Covered Under the General Permit

18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.

21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[2]

23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of

[2] Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

C. Activities Not Covered Under the General Permit

24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.

28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

29. Construction activity covered by an individual NPDES Permit for storm water discharges.

30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 (“R” in the Revised Universal Soil Loss Equation).

31. Landfill construction activity that is subject to the Industrial General Permit.

32. Construction activity that discharges to Combined Sewer Systems.

33. Conveyances that discharge storm water runoff combined with municipal sewage.

34. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

D. Obtaining and Modifying General Permit Coverage

36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.

37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)[3]. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

40. This General Permit prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.

42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

43. This General Permit prohibits the discharge of any debris[4] from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

F. Training

44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.

45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

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[3] BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[4] Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

G. Determining and Reducing Risk

46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.

47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.

48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.

49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.

50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS[5]) can prevent or reduce the release of fine particles from construction sites.

[5] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

Use of an ATS can effectively reduce a site's risk of impacting receiving waters.

51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, “The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities,” dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel’s suggestions into this General Permit, which includes numeric action levels (NALs) for pH and turbidity, and special numeric limits for ATS discharges.

Determining Compliance with Numeric Limitations

53. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. An exceedance of a NAL does not constitute a violation of this General Permit.

54. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is

required to provide an NAL Exceedance Report when requested by a Regional Water Board.

I. Receiving Water Limitations

55. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

J. Sampling, Monitoring, Reporting and Record Keeping

56. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

57. Records of all visual monitoring inspections are required to remain on-site during the construction period and for a minimum of three years.

58. For all Risk Level 3/LUP Type 3 and Risk Level 2/LUP Type 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.

59. Risk Level 3 and LUP Type 3 sites with effluent that exceeds the Receiving Water Monitoring Triggers contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring. An exceedance of a Receiving Water Monitoring Trigger does not constitute a violation of this General Permit.

60. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) as an exemptions to the receiving water monitoring requirements for Risk Level 3 and LUP Type 3 dischargers.

61. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

62. For Risk Level 3 and LUP Type 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.

63. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.

64. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.

65. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.

66. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

K. Active Treatment System (ATS) Requirements

67. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.

68. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.

69. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.

70. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.

71. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

L. Post-Construction Requirements

72. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, “Requiring Sustainable Water Resources Management.“ The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This “runoff reduction” approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.

73. LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

M. Storm Water Pollution Prevention Plan Requirements

74. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.

75. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

N. Regional Water Board Authorities

76. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this

General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)[6]:

II. CONDITIONS FOR PERMIT COVERAGE

A. Linear Underground/Overhead Projects (LUPs)

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. The Legally Responsible Person is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

[6] These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

B. Obtaining Permit Coverage Traditional Construction Sites

1. The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.

2. To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

3. PRDs shall consist of:

   a. Notice of Intent (NOI)
   b. Risk Assessment (Section VIII)
   c. Site Map
   d. Storm Water Pollution Prevention Plan (Section XIV)
   e. Annual Fee
   f. Signed Certification Statement

   Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

   Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

4. This permit is effective on July 1, 2010.

   a. **Dischargers Obtaining Coverage On or After July 1, 2010:** All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.

   b. **Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ:** Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated.

Existing dischargers shall electronically file their PRDs no later than July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, **or else lose permit coverage**. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.

6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.

7. Small Construction Rainfall Erosivity Waiver

   EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

   Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

   If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the

rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. Revising Permit Coverage for Change of Acreage or New Ownership

1. The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.

2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:

   a. A revised NOI indicating the new project size;

   b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.

   c. SWPPP revisions, as appropriate; and

   d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.

   e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved "Final Stabilization" as defined in Section II.D.

4. When an LRP with active General Permit coverage transfers its LRP status to another person or entity that qualifies as an LRP, the existing LRP shall inform the new LRP of the General Permit's requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

D. Conditions for Termination of Coverage

1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:

   a. For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;

   b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;

   c. Final stabilization has been reached;

   d. Construction materials and wastes have been disposed of properly;

   e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated;

   f. Post-construction storm water management measures have been installed and a long-term maintenance plan[7] has been established; and

   g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

[7] For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:

   a. "70% final cover method," no computational proof required

      OR:

   b. "RUSLE or RUSLE2 method," computational proof required

      OR:

   c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Section II.D.1.a.

III. DISCHARGE PROHIBITIONS

A. Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

B. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.

C. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;

2. The discharge does not violate any other provision of this General Permit;

3. The discharge is not prohibited by the applicable Basin Plan;

4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.

5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

6. The discharge is monitored and meets the applicable NALs; and

7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

D. Debris resulting from construction activities are prohibited from being discharged from construction sites.

E. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

IV. SPECIAL PROVISIONS

A. Duty to Comply

1. The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

2. The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

B. General Permit Actions

1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

G. Duty to Maintain Records and Provide Information

1. The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.

2. The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

3. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

2. Changes to Authorization. If an Approved Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an Approved Signatory.

3. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's Approved Signatory.

J. Certification

Any person signing documents under Section IV.I above, shall make the following 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, to the best of my knowledge and belief, the information submitted is, 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."

K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

L. Bypass

Bypass[8] is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;[9]

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;

3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or

4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

M. Upset

1. A discharger that wishes to establish the affirmative defense of an upset[10] in an action brought for noncompliance shall demonstrate,

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[8] The intentional diversion of waste streams from any portion of a treatment facility

[9] Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

[10] An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the discharger can identify the cause(s) of the upset

b. The treatment facility was being properly operated by the time of the upset

c. The discharger submitted notice of the upset as required; and

d. The discharger complied with any remedial measures required

2. No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

N. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

O. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

P. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

Q. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[11] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

S. Transfers

This General Permit is not transferable.

T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

[11] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

V. EFFLUENT STANDARDS & RECEIVING WATER MONITORING

A. Narrative Effluent Limitations

1. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

2. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

Table 1- Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level
pH	Field test with calibrated portable instrument	Risk Level 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5
		Risk Level 3			lower NAL = 6.5 upper NAL = 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2	1	NTU	250 NTU
		Risk Level 3			250 NTU

B. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for

pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

2. For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.

3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

   a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

      AND/OR:

   b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

C. Receiving Water Monitoring Triggers

1. The receiving water monitoring triggers for Risk Level 3 dischargers with direct discharges to surface waters are triggered when the daily average effluent pH values during any site phase when there is a high risk of pH discharge[12] fall outside of the range of 6.0 and 9.0 pH units, or when the daily average effluent turbidity exceeds 500 NTU.

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2. Risk Level 3 dischargers with with direct discharges to surface waters shall conduct receiving water monitoring whenever their effluent monitoring results exceed the receiving water monitoring triggers. If the pH trigger is exceeded, the receiving water shall be monitored for pH for the duration of coverage under this General Permit. If the turbidity trigger is exceeded, the receiving water shall be monitored for turbidity and SSC for the duration of coverage under this general permit.

3. Risk Level 3 dischargers with direct discharges to surfaces waters shall initiate receiving water monitoring when the triggers are exceeded unless the storm event causing the exceedance is determined after the fact to equal to or greater than the 5-year 24-hour storm (expressed in inches of rainfall) as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Verification of the 5-year 24-hour storm event shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

[12] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

VI. RECEIVING WATER LIMITATIONS

A. The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

B. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

C. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

D. Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

B. SWPPP Certification Requirements

1. **Qualified SWPPP Developer:** The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

   a. A California registered professional civil engineer;

   b. A California registered professional geologist or engineering geologist;

   c. A California registered landscape architect;

   d. A professional hydrologist registered through the American Institute of Hydrology;

   e. A Certified Professional in Erosion and Sediment Control (CPESC) ™ registered through Enviro Cert International, Inc.;

   f. A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert International, Inc.; or

   g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

3. **Qualified SWPPP Practitioner:** The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or

   b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.

5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds,[13] the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

IX. RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

XI. RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

[13] Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://gis.ca.gov/catalog/BrowseRecord.epl?id=22175 .

XIII. POST-CONSTRUCTION STANDARDS

A. All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.

1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.

2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.

3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.

4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream[14] or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

[14] A first order stream is defined as a stream with no tributaries.

B. All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

XIV. SWPPP REQUIREMENTS

A. The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;

4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and

5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

B. To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

C. The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

XV. REGIONAL WATER BOARD AUTHORITIES

A. In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.

B. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

C. Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

D. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

E. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

XVI. ANNUAL REPORTING REQUIREMENTS

A. All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.

B. The discharger shall certify each Annual Report in accordance with the Special Provisions.

C. The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

D. The discharger shall include storm water monitoring information in the Annual Report consisting of:

1. a summary and evaluation of all sampling and analysis results, including copies of laboratory reports;

2. the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

3. a summary of all corrective actions taken during the compliance year;

4. identification of any compliance activities or corrective actions that were not implemented;

5. a summary of all violations of the General Permit;

6. the names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;

7. the date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and

8. the visual observation and sample collection exception records and reports specified in Attachments C, D, and E.

E. The discharger shall provide training information in the Annual Report consisting of:

1. documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;

2. documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and

3. documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

ATTACHMENT A
Linear Underground/ Overhead Requirements

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All Linear Underground/Overhead project dischargers who submit permit registration documents (PRDs) indicating their intention to be regulated under the provisions of this General Permit shall comply with the following:

A. DEFINITION OF LINEAR UNDERGROUND/OVERHEAD PROJECTS

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquiescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. LUP evaluation shall consist of two tasks:

a. Confirm that the project or project section(s) qualifies as an LUP. The State Water Board website contains a project determination guidance flowchart. http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

b. Identify which Type(s) (1, 2 or 3 described in Section I below) are applicable to the project or project sections based on project sediment and receiving water risk. (See Attachment A.1)

3. A Legally Responsible Person (LRP) for a Linear Underground/Overhead project is required to obtain CGP coverage under one or more permit registration document (PRD) electronic submittals to the State Water Board's Storm Water Multi-Application and Report Tracking (SMARTs) system. Attachment A.1 contains a flow chart to be used when determining if a linear project qualifies for coverage and to determine LUP Types. Since a LUP may be constructed within both developed and undeveloped locations and portions of LUPs may be constructed by different contractors, LUPs may be broken into logical permit sections. Sections may be determined based on portions of a project conducted by one contractor. Other situations may also occur, such as the time period in which the sections of a project will be constructed (e.g. project phases), for which separate permit coverage is possible. For projects that are broken into separate sections, a description of how each section relates to the overall project and the definition of the boundaries between sections shall be clearly stated.

4. Where construction activities transverse or enter into different Regional Water Board jurisdictions, LRPs shall obtain permit coverage for each Regional Water Board area involved prior to the commencement of construction activities.

5. Small Construction Rainfall Erosivity Waiver

EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

If a small linear construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

B. LINEAR PROJECT PERMIT REGISTRATION DOCUMENTS (PRDs)

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted. PRDs shall consist of the following:

1. Notice of Intent (NOI)

Prior to construction activities, the LRP of a proposed linear underground/overhead project shall utilize the processes and methods provided in Attachment A.2, Permit Registration Documents (PRDs) – General Instructions for Linear Underground/Overhead Projects to comply with the Construction General Permit.

2. Site Maps

LRPs submitting PRDs shall include at least 3 maps. The first map will be a zoomed[1] 1000-1500 ft vicinity map that shows the starting point of the project. The second will be a zoomed map of 1000-1500 ft showing the ending location of the project. The third will be a larger view vicinity map, 1000 ft to 2000 ft, displaying the entire project location depending on the project size, and indicating the LUP type (1, 2 or 3) areas within the total project footprint.

3. Drawings

LRPs submitting PRDs shall include a construction drawing(s) or other appropriate drawing(s) or map(s) that shows the locations of storm drain

[1] An image with a close-up/enhanced detailed view of site features that show minute details such as streets and neighboring structures.
Or: An image with a close-up/enhanced detailed view of the site's surrounding infrastructure.
Or: An image with a close up detailed view of the project and its surroundings.

inlets and waterbodies[2] that may receive discharges from the construction activities and that shows the locations of BMPs to be installed for all those BMPs that can be illustrated on the revisable drawing(s) or map(s). If storm drain inlets, waterbodies, and/or BMPs cannot be adequately shown on the drawing(s) or map(s) they should be described in detail within the SWPPP.

4. Storm Water Pollution Prevention Plan (SWPPP)

LUP dischargers shall comply with the SWPPP Preparation, Implementation, and Oversight requirements in Section K of this Attachment.

5. Contact information

LUP dischargers shall include contact information for all contractors (or subcontractors) responsible for each area of an LUP project. This should include the names, telephone numbers, and addresses of contact personnel. Specific areas of responsibility of each contact, and emergency contact numbers should also be included.

6. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. LINEAR PROJECT TERMINATION OF COVERAGE REQUIREMENTS

The LRP may terminate coverage of an LUP when construction activities are completed by submitting an electronic notice of termination (NOT) through the State Water Board's SMARTS system. Termination requirements are different depending on the complexity of the LUP. An LUP is considered complete when: (a) there is no potential for construction-related storm water pollution; (b) all elements of the SWPPP have been completed; (c) construction materials and waste have been disposed of properly; (d) the site is in compliance with all local storm water management requirements; and (e) the LRP submits a notice of termination (NOT) and has received approval for termination from the appropriate Regional Water Board office.

1. LUP Stabilization Requirements

The LUP discharger shall ensure that all disturbed areas of the construction site are stabilized prior to termination of coverage under this General Permit. Final stabilization for the purposes of submitting an NOT

[2] Includes basin(s) that the MS4 storm sewer systems may drain to for Hydromodification or Hydrological Conditional of Concerns under the MS4 permits.

is satisfied when all soil disturbing activities are completed and one of the following criteria is met:

a. In disturbed areas that were vegetated prior to construction activities of the LUP, the area disturbed must be re-established to a uniform vegetative cover equivalent to 70 percent coverage of the preconstruction vegetative conditions. Where preconstruction vegetation covers less than 100 percent of the surface, such as in arid areas, the 70 percent coverage criteria is adjusted as follows: if the preconstruction vegetation covers 50 percent of the ground surface, 70 percent of 50 percent (.70 X .50=.35) would require 35 percent total uniform surface coverage; or

b. Where no vegetation is present prior to construction, the site is returned to its original line and grade and/or compacted to achieve stabilization; or

c. Equivalent stabilization measures have been employed. These measures include, but are not limited to, the use of such BMPs as blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments.

2. LUP Termination of Coverage Requirements

The LRP shall file an NOT through the State Water Board's SMARTS system. By submitting an NOT, the LRP is certifying that construction activities for an LUP are complete and that the project is in full compliance with requirements of this General Permit and that it is now compliant with soil stabilization requirements where appropriate. Upon approval by the appropriate Regional Water Board office, permit coverage will be terminated.

3. Revising Coverage for Change of Acreage

When the LRP of a portion of an LUP construction project changes, or when a phase within a multi-phase project is completed, the LRP may reduce the total acreage covered by this General Permit. In reducing the acreage covered by this General Permit, the LRP shall electronically file revisions to the PRDs that include:

a. a revised NOI indicating the new project size;

b. a revised site map showing the acreage of the project completed, acreage currently under construction, acreage sold, transferred or added, and acreage currently stabilized.

c. SWPPP revisions, as appropriate; and

d. certification that any new LRPs have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address (if known) of the new LRP.

If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

D. DISCHARGE PROHIBITIONS

1. LUP dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

2. LUP dischargers are prohibited from discharging non-storm water that is not otherwise authorized by this General Permit. Non-storm water discharges authorized by this General Permit[3] may include, fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, street cleaning, dewatering,[4] uncontaminated groundwater from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. Such discharges are allowed by this General Permit provided they are not relied upon to clean up failed or inadequate construction or post-construction BMPs designed to keep materials on site. These authorized non-storm water discharges:

[3] Dischargers must identify all authorized non-storm water discharges in the LUP's SWPPP and identify BMPs that will be implemented to either eliminate or reduce pollutants in non-storm water discharges. Regional Water Boards may direct the discharger to discontinue discharging such non-storm water discharges if determined that such discharges discharge significant pollutants or threaten water quality.
[4]Dewatering activities may be prohibited or need coverage under a separate permit issued by the Regional Water Boards. Dischargers shall check with the appropriate Regional Water Boards for any required permit or basin plan conditions prior to initial dewatering activities to land, storm drains, or waterbodies.

a. Shall not cause or contribute to a violation of any water quality standard;

b. Shall not violate any other provision of this General Permit;

c. Shall not violate any applicable Basin Plan;

d. Shall comply with BMPs as described in the SWPPP;

e. Shall not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

f. Shall be monitored and meets the applicable NALs; and

g. Shall be reported by the discharger in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not authorized by this General Permit to determine the need for a separate NPDES permit.

Additionally, some LUP dischargers may be required to obtain a separate permit if the applicable Regional Water Board has adopted a General Permit for dewatering discharges. Wherever feasible, alternatives, that do not result in the discharge of non-storm water, shall be implemented in accordance with this Attachment's Section K.2 - SWPPP Implementation Schedule.

3. LUP dischargers shall ensure that trench spoils or any other soils disturbed during construction activities that are contaminated[5] are not discharged with storm water or non-storm water discharges into any storm drain or water body except pursuant to an NPDES permit.

When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the LUP discharger shall have those soils sampled and tested to ensure that proper handling and public safety measures are

[5] Contaminated soil contains pollutants in concentrations that exceed the appropriate thresholds that various regulatory agencies set for those substances. Preliminary testing of potentially contaminated soils will be based on odor, soil discoloration, or prior history of the site's chemical use and storage and other similar factors. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The legally responsible person will notify the appropriate local, State, or federal agency(ies) when contaminated soil is found at a construction site, and will notify the Regional Water Board by submitting an NOT at the completion of the project.

implemented. The LUP discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

4. Discharging any pollutant-laden water that will cause or contribute to an exceedance of the applicable Regional Water Board's Basin Plan from a dewatering site or sediment basin into any receiving water or storm drain is prohibited.

5. Debris[6] resulting from construction activities are prohibited from being discharged from construction project sites.

E. SPECIAL PROVISIONS

1. Duty to Comply

a. The LUP discharger must comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

b. The LUP discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

2. General Permit Actions

a. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

[6] Litter, rubble, discarded refuse, and remains of something destroyed.

b. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an LUP discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

4. Duty to Mitigate

The LUP discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper Operation and Maintenance

The LUP discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit and with the requirements of the Storm Water Pollution Prevention Plan (SWPPP). Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

6. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

7. Duty to Maintain Records and Provide Information

a. The LUP discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be kept at the construction site or in a crew

member's vehicle until construction is completed, and shall be made available upon request.

b. The LUP discharger shall furnish the Regional Water Board, State Water Board, or USEPA, within a reasonable time, any requested information to determine compliance with this General Permit. The LUP discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

8. Inspection and Entry

The LUP discharger shall allow the Regional Water Board, State Water Board, USEPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

b. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

c. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

d. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

9. Electronic Signature and Certification Requirements

a. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

b. Changes to Authorization. If an Approved Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or

together with any reports, information or applications to be signed by an Approved Signatory.

c. All SWPPP revisions, annual reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, USEPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's Approved Signatory.

10. Certification

Any person signing documents under Section E.9 above, shall make the following 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, to the best of my knowledge and belief, the information submitted is, 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."

11. Anticipated Noncompliance

The LUP discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

12. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

13. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the LUP discharger is or may be subject to under Section 311 of the CWA.

14. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

15. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of USEPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

16. Penalties for Violations of Permit Conditions

a. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[7] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

b. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

17. Transfers

This General Permit is not transferable. A new LRP of an ongoing construction activity must submit PRDs in accordance with the requirements of this General Permit to be authorized to discharge under this General Permit. An LRP who is a property owner with active General Permit coverage who sells a fraction or all the land shall inform the new property owner(s) of the requirements of this General Permit.

18. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those

[7] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act

dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

F. EFFLUENT STANDARDS & RECEIVING WATER MONITORING

1. Narrative Effluent Limitations

a. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges regulated by this General Permit do not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

b. LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of structural or non-structural controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

Table 1. Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level
pH	Field test with calibrated portable instrument	LUP Type 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5
		LUP Type 3			lower NAL = 6.5 upper NAL = 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	LUP Type 2	1	NTU	250 NTU
		LUP Type 3			250 NTU

2. Numeric Action Levels (NALs)

a. For LUP Type 2 and 3 dischargers, the lower storm event daily average NAL for pH is 6.5 pH units and the upper storm event daily average NAL for pH is 8.5 pH units. The LUP discharger shall take actions as described below if the storm event daily average discharge is outside of this range of pH values.

b. For LUP Type 2 and 3 dischargers, the storm event daily average NAL for turbidity is 250 NTU. The discharger shall take actions as described below if the storm event daily average discharge is outside of this range of turbidity values.

c. Whenever daily average analytical effluent monitoring results indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the LUP discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

d. The site evaluation will be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

i Are related to the construction activities and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

AND/OR:

ii Are related to the run-on associated with the construction site location and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) decide what corrective action(s) were taken or will be taken, including a description of the schedule for completion.

3. Receiving Water Monitoring Triggers

a. The receiving water monitoring triggers for LUP Type 3 dischargers with direct discharges to surface waters are triggered when the daily average effluent pH values during any site phase when there is a high risk of pH discharge[8] fall outside of the range of 6.0 and 9.0 pH units, or when the daily average effluent turbidity exceeds 500 NTU.

b. LUP Type 3 dischargers with direct discharges to surface waters shall conduct receiving water monitoring whenever their effluent monitoring results exceed the receiving water monitoring triggers. If the pH trigger is exceeded, the receiving water shall be monitored for pH for the duration of coverage under this General Permit. If the turbidity trigger is exceeded, the receiving water shall be monitored for turbidity and SSC for the duration of coverage under this General Permit.

c. LUP Type 3 dischargers with direct discharges to surfaces waters shall initiate receiving water monitoring when the triggers are exceeded unless the storm event causing the exceedance is determined after the fact to equal to or greater than the 5-year 24-hour storm (expressed in inches of rainfall) as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Verification of the 5-year 24-hour storm event shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

d. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

G. RECEIVING WATER LIMITATIONS

1. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

2. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

3. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or

[8] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

H. TRAINING QUALIFICATIONS

1. General

All persons responsible for implementing requirements of this General Permit shall be appropriately trained. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Persons responsible for preparing, amending and certifying SWPPPs shall comply with the requirements in this Section H.

2. SWPPP Certification Requirements

a. **Qualified SWPPP Developer:** The LUP discharger shall ensure that all SWPPPs be written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

i A California registered professional civil engineer;

ii A California registered professional geologist or engineering geologist;

iii A California registered landscape architect;

iv A professional hydrologist registered through the American Institute of Hydrology;

v A certified professional in erosion and sediment control (CPESC) ™ registered through Enviro Cert International, Inc;

vi A certified professional in storm water quality (CPSWQ)™ registered through Enviro Cert International, Inc.; or

vii A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

b. The LUP discharger shall ensure that the SWPPP is written and amended, as needed, to address the specific circumstances for each construction site covered by this General Permit prior to commencement of construction activity for any stage.

c. The LUP discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

d. **Qualified SWPPP Practitioner:** The LUP discharger shall ensure that all elements of any SWPPP for each project will be implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis, and for ensuring full compliance with the permit and implementation of all elements of the SWPPP. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   i A certified erosion, sediment and storm water inspector registered through Certified Professional in Erosion and Sediment Control, Inc.; or

   ii A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

e. The LUP discharger shall ensure that the SWPPP include a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner, and who is ultimately responsible for implementation of the SWPPP. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

f. The LUP discharger shall ensure that the SWPPP and each amendment be signed by the Qualified SWPPP Developer. The LUP discharger shall include a listing of the date of initial preparation and the dates of each amendment in the SWPPP.

I. TYPES OF LINEAR PROJECTS

This attachment establishes three types (Type 1, 2 & 3) of complexity for areas within an LUP or project section based on threat to water quality. Project area Types are determined through Attachment A.1.

The Type 1 requirements below establish the baseline requirements for all LUPs subject to this General Permit. Additional requirements for Type 2 and Type 3 LUPs are labeled.

1. Type 1 LUPs*:*

LUP dischargers with areas of a LUP designated as Type 1 shall comply with the requirements in this Attachment. Type 1 LUPs are:

a. Those construction areas where 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day; or

b. Where greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

   i Areas disturbed during construction will be returned to preconstruction conditions or equivalent protection is established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

   ii Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization BMPs will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

c. Where the risk determination is as follows:

   i Low sediment risk, low receiving water risk, or

   ii Low sediment risk, medium receiving water risk, or

   iii Medium sediment risk, low receiving water risk

2. Type 2 LUPs:

Type 2 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 2 LUPs have the specified combination of risk:

d. High sediment risk, low receiving water risk, or

e. Medium sediment risk, medium receiving water risk, or

f. Low sediment risk, high receiving water risk

Receiving water risk is either considered "Low" for those areas of the project that are not in close proximity to a sensitive receiving watershed, "Medium" for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, and "High" where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C of this General Permit.

3. Type 3 LUPs:

Type 3 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 3 LUPs have the specified combination of risk:

a. High sediment risk, high receiving water risk, or

b. High sediment risk, medium receiving water risk, or

c. Medium sediment risk, high receiving water risk

Receiving water risk is either considered "Medium" for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, or "High" where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C.

J. LUP TYPE-SPECIFIC REQUIREMENTS

1. Effluent Standards

a. Narrative – LUP dischargers shall comply with the narrative effluent standards below.

i Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

ii LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

b. Numeric – LUP Type 1 dischargers are not subject to a numeric effluent standard

c. Numeric –LUP Type 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

d. Numeric – LUP Type 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

2. Good Site Management "Housekeeping"

a. LUP dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, the good housekeeping measures shall consist of the following:

i Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

ii Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

iii Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

iv Minimize exposure of construction materials to precipitation (not applicable to materials designed to be outdoors and exposed to the environment).

v Implement BMPs to control the off-site tracking of loose construction and landscape materials.

b. LUP dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

i Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

ii Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

iii Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

iv Cover waste disposal containers at the end of every business day and during a rain event.

v Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

vi Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

vii Implement procedures that effectively address hazardous and non-hazardous spills.

viii Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

(1) Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

(2) Appropriate spill response personnel are assigned and trained.

ix Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

c. LUP dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   i Prevent oil, grease, or fuel from leaking into the ground, storm drains or surface waters.

   ii Implement appropriate BMPs whenever equipment or vehicles are fueled, maintained or stored.

   iii Clean leaks immediately and disposing of leaked materials properly.

d. LUP dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   i Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   ii Contain fertilizers and other landscape materials when they are not actively being used.

   iii Discontinue the application of any erodible landscape material at least 2 days before a forecasted rain event[9] or during periods of precipitation.

   iv Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   v Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

e. LUP dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, LUP dischargers shall do the following:

[9] 50% or greater chance of producing precipitation.

i Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

ii Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

iii Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

iv Ensure retention of sampling, visual observation, and inspection records.

v Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

f. LUP dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations.

3. Non-Storm Water Management

a. LUP dischargers shall implement measures to control all non-storm water discharges during construction.

b. LUP dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

c. LUP dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

4. Erosion Control

a. LUP dischargers shall implement effective wind erosion control.

b. LUP dischargers shall provide effective soil cover for inactive[10] areas and all finished slopes, and utility backfill.

[10] Areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days

c. LUP dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

5. Sediment Controls

a. LUP dischargers shall establish and maintain effective perimeter controls as needed, and implement effective BMPs for all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

b. On sites where sediment basins are to be used, LUP dischargers shall, at minimum, design sediment basins according to the guidance provided in CASQA's Construction BMP Handbook.

c. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[11] in accordance with Table 2 below.

Table 2 – Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

d. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent off-site tracking of sediment.

e. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

f. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall inspect all immediate access roads. At a minimum daily and prior to any rain event, the discharger shall remove any

[11] Sheet flow length is the length that shallow, low velocity flow travels across a site.

sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

g. **Additional LUP Type 3 Requirement:** The Regional Water Board may require LUP Type 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

6. Run-on and Run-off Controls

a. LUP dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site-shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this Attachment.

b. Run-on and runoff controls are not required for Type 1 LUPs unless the evaluation of quantity and quality of run-on and runoff deems them necessary or visual inspections show that the site requires such controls.

7. Inspection, Maintenance and Repair

a. All inspection, maintenance repair and sampling activities at the discharger's LUP location shall be performed or supervised by a QSP representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

b. LUP dischargers shall conduct visual inspections and observations daily during working hours (not recorded). At least once each 24-hour period during extended storm events, **LUP Type 2 & 3 dischargers** shall conduct visual inspections to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

c. Upon identifying failures or other shortcomings, as directed by the QSP, LUP dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

d. For each pre- and post-rain event inspection required, LUP dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format that includes the information described below.

e. The LUP discharger shall ensure that the checklist remains on-site or with the SWPPP. At a minimum, an inspection checklist should include:

i Inspection date and date the inspection report was written.

ii Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

iii Site information, including stage of construction, activities completed, and approximate area of the site exposed.

iv A description of any BMPs evaluated and any deficiencies noted.

v If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

vi Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

vii Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

viii Photographs taken during the inspection, if any.

ix Inspector's name, title, and signature.

K. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS

1. Objectives

SWPPPs for all LUPs shall be developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

a. All pollutants and their sources, including sources of sediment, associated with construction activities associated with LUP activity are controlled;

b. All non-storm water discharges are identified and either eliminated, controlled, or treated;

c. BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from LUPs during construction; and

d. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed are effective and maintained.

2. SWPPP Implementation Schedule

a. LUPs for which PRDs have been submitted to the State Water Board shall develop a site/project location SWPPP prior to the start of land-disturbing activity in accordance with this Section and shall implement the SWPPP concurrently with commencement of soil-disturbing activities.

b. For an ongoing LUP involving a change in the LRP, the new LRP shall review the existing SWPPP and amend it, if necessary, or develop a new SWPPP within 15 calendar days to conform to the requirements set forth in this General Permit.

3. Availability

The SWPPP shall be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

L. REGIONAL WATER BOARD AUTHORITIES

1. Regional Water Boards shall administer the provisions of this General Permit. Administration of this General Permit may include, but is not limited to, requesting the submittal of SWPPPs, reviewing SWPPPs, reviewing monitoring and sampling and analysis reports, conducting compliance inspections, gathering site information by any medium including sampling, photo and video documentation, and taking enforcement actions.

2. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

3. Regional Water Boards may issue separate permits for discharges of storm water associated with construction activity to individual dischargers, categories of dischargers, or dischargers in a geographic area. Upon issuance of such permits by a Regional Water Board, dischargers subject to those permits shall no longer be regulated by this General Permit.

4. Regional Water Boards may direct the discharger to reevaluate the LUP Type(s) for the project (or elements/areas of the project) and impose the appropriate level of requirements.

5. Regional Water Boards may terminate coverage under this General Permit for dischargers who negligently or with willful intent incorrectly determine or report their LUP Type (e.g., they determine themselves to be a LUP Type 1 when they are actually a Type 2).

6. Regional Water Boards may review PRDs and reject or accept applications for permit coverage or may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

7. Regional Water Boards may impose additional requirements on dischargers to satisfy TMDL implementation requirements or to satisfy provisions in their Basin Plans.

8. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

9. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

10. Based on an LUP's threat to water quality and complexity, the Regional Water Board may determine on a case-by-case basis that an LUP, or a portion of an LUP, is not eligible for the linear project requirements contained in this Attachment, and require that the discharger comply with all standard requirements in this General Permit.

11. The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

M. MONITORING AND REPORTING REQUIREMENTS

Table 3. LUP Summary of Monitoring Requirements

LUP Type	Visual Inspections				Sample Collection		
	Daily Site BMP	Pre-storm Event / Baseline	Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water	Non-Visible (when applicable)
1	X						x
2	X	X	X	X	X		x
3	X	X	X	X	X	X	x

1. Objectives

LUP dischargers shall prepare a monitoring and reporting program (M&RP) prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The M&RP must be a part of the SWPPP, included as an appendix or separate SWPPP chapter.

2. M&RP Implementation Schedule

a. LUP dischargers shall implement the requirements of this Section at the time of commencement of construction activity. LUP dischargers are responsible for implementing these requirements until construction activity is complete and the site is stabilized.

b. LUP dischargers shall revise the M&RP when:

i Site conditions or construction activities change such that a change in monitoring is required to comply with the requirements and intent of this General Permit.

ii The Regional Water Board requires the discharger to revise its M&RP based on its review of the document. Revisions may include, but not be limited to, conducting additional site inspections, submitting reports, and certifications. Revisions shall be submitted via postal mail or electronic e-mail.

iii The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

3. LUP Type 1 Monitoring and Reporting Requirements

a. LUP Type 1 Inspection Requirements

i LUP Type 1 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 1 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 1 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 1 dischargers shall conduct daily visual inspections to verify that:

(1) Appropriate BMPs for storm water and non-storm water are being implemented in areas where active construction is occurring (including staging areas);

(2) Project excavations are closed, with properly protected spoils, and that road surfaces are cleaned of excavated material and construction materials such as chemicals by either removing or storing the material in protective storage containers at the end of every construction day;

(3) Land areas disturbed during construction are returned to pre-construction conditions or an equivalent protection is used at the end of each workday to eliminate or minimize erosion and the possible discharge of sediment or other pollutants during a rain event.

v Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures

are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vi Inspection programs are required for LUP Type 1 projects where temporary and permanent stabilization BMPs are installed and are to be monitored after active construction is completed. Inspection activities shall continue until adequate permanent stabilization is established and, in areas where re-vegetation is chosen, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

b. LUP Type 1 Monitoring Requirements for Non-Visible Pollutants

LUP Type 1 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where the LUP Type 1 discharger believes pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help the LUP Type 1 discharger determine when to collect samples.

(2) The LUP Type 1 discharger is not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 1 dischargers shall collect samples down-gradient from all discharge locations where the visual observations were made triggering the monitoring, and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 1 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 1 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[12]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 1 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 1 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

c. <u>LUP Type 1 Visual Observation Exceptions</u>

i LUP Type 1 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. The Type 1 LUP discharger is not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

[12] Sample collected at a location unaffected by contruction activities.

ii If the LUP Type 1 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

d. Particle Size Analysis for Risk Justification

LUP Type 1 dischargers utilizing justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

4. LUP Type 2 & 3 Monitoring and Reporting Requirements

a. LUP Type 2 & 3 Inspection Requirements

i LUP Type 2 & 3 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 2 & 3 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 2 & 3 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 2 & 3 dischargers shall conduct daily visual inspections to verify that appropriate BMPs for storm water and non-storm water are being implemented and in place in areas where active construction is occurring (including staging areas).

v LUP Type 2 & 3 dischargers shall conduct inspections of the construction site prior to anticipated storm events, during extended storm events, and after actual storm events to identify areas contributing to a discharge of storm water associated with construction activity. Pre-storm inspections are to ensure that BMPs are properly installed and maintained; post-storm inspections are to assure that BMPs have functioned adequately. During

extended storm events, inspections shall be required during normal working hours for each 24-hour period.

vi Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vii LUP Type 2 & 3 dischargers shall implement a monitoring program for inspecting projects that require temporary and permanent stabilization BMPs after active construction is complete. Inspections shall ensure that the BMPs are adequate and maintained. Inspection activities shall continue until adequate permanent stabilization is established and, in vegetated areas, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

viii If possible, LUP Type 2 & 3 dischargers shall install a rain gauge on-site at an accessible and secure location with readings made during all storm event inspections. When readings are unavailable, data from the closest rain gauge with publically available data may be used.

ix LUP Type 2 & 3 dischargers shall Include and maintain a log of the inspections conducted in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection.

b. <u>LUP Type 2 & 3 Storm Water Effluent Monitoring Requirements</u>

Table 4. LUP Type 2 & 3 Effluent Monitoring Requirements

LUP Type	Frequency	Effluent Monitoring
2	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	Turbidity, pH, and non-visible pollutant parameters (if applicable)
3	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	turbidity, pH, and non-visible pollutant parameters (if applicable)

i LUP Type 2 & 3 dischargers shall collect storm water grab samples from sampling locations characterizing discharges associated with activity from the LUP active areas of construction. At a minimum, 3 samples shall be collected per day of discharge.

ii LUP Type 2 & 3 dischargers shall collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

iii LUP Type 2 & 3 dischargers shall ensure that storm water grab sample(s) obtained be representative of the flow and characteristics of the discharge.

iv LUP Type 2 & 3 dischargers shall analyze their effluent samples for:

(1) pH and turbidity
(2) Any additional parameter for which monitoring is required by the Regional Water Board.

c. <u>LUP Type 2 & 3 Storm Water Effluent Sampling Locations</u>

i LUP Type 2 & 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire disturbed project or area.

ii LUP Type 2 & 3 dischargers may monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of NALs.

iii LUP Type 2 & 3 dischargers shall select analytical test methods from the list provided in Table 5 below.

iv LUP Type 2 & 3 dischargers shall ensure that all storm water sample collection preservation and handling shall be conducted in accordance with the “Storm Water Sample Collection and Handling Instructions” below.

d. <u>LUP Type 3 Receiving Water Monitoring Requirements</u>

i In the event that an LUP Type 3 discharger’s effluent exceeds the receiving water monitoring triggers of 500 NTU turbidity or pH range of 6.0-9.0, contained in this General Permit and has a direct discharge to receiving waters, the LUP discharger shall subsequently sample Receiving Waters (RWs) for turbidity, pH (if applicable) and SSC for the duration of coverage under this General Permit. In the event that an LUP Tupe 3 discharger utilizing ATS with direct discharges into receiving waters discharges effluent that exceeds the NELs in this permit, the discharger shall

subsequently sample RWs for turbidity, pH (if applicable), and SSC for the duration of coverage under this General Permit.

ii LUP Type 3 dischargers that meet the project criteria in Appendix 3 of this General Permit and have more than 30 acres of soil disturbance in the project area or project section area designated as Type 3, shall comply with the Bioassessment requirements prior to commencement of construction activity.

iii LUP Type 3 dischargers shall obtain RW samples in accordance with the requirements of the Receiving Water Sampling Locations section (Section M.4.c. of this Attachment).

e. LUP Type 3 Receiving Water Sampling Locations

i **Upstream/up-gradient RW samples**: LUP Type 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible to and upstream from the effluent discharge point.

ii **Downstream/down-gradient RW samples**: LUP Type 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible to and downstream from the effluent discharge point.

iii If two or more discharge locations discharge to the same receiving water, LUP Type 3 dischargers may sample the receiving water at a single upstream and downstream location.

f. LUP Type 2 & 3 Monitoring Requirements for Non-Visible Pollutants

LUP Type 2 & 3 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where LUP Type 2 & 3 dischargers believe pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help LUP Type 2 & 3 dischargers determine when to collect samples.

(2) LUP Type 2 & 3 dischargers are not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 2 & 3 dischargers shall collect samples down-gradient from the discharge locations where the visual observations were made triggering the monitoring and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 2 & 3 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 2 & 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 2 & 3 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[13]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 2 & 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 2 & 3 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed.

[13] Sample collected at a location unaffected by construction activities

Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 2 & 3 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

g. LUP Type 2 & 3 Visual Observation and Sample Collection Exceptions

i LUP Type 2 & 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. Type 2 & 3 LUP dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

ii If the LUP Type 2 or 3 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

h. LUP Type 2 & 3 Storm Water Sample Collection and Handling Instructions

LUP Type 2 & 3 dischargers shall refer to Table 5 below for test Methods, detection Limits, and reporting Units. During storm water sample collection and handling, the LUP Type 2 & 3 discharger shall:

i Identify the parameters required for testing and the number of storm water discharge points that will be sampled. Request the laboratory to provide the appropriate number of sample containers, types of containers, sample container labels, blank chain of custody forms, and sample preservation instructions.

ii Determine how to ship the samples to the laboratory. The testing laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.

iii Use only the sample containers provided by the laboratory to collect and store samples. Use of any other type of containers could contaminate your samples.

iv Prevent sample contamination, by not touching, or putting anything into the sample containers before collecting storm water samples.

v Not overfilling sample containers. Overfilling can change the analytical results.

vi Tightly screw the cap of each sample container without stripping the threads of the cap.

vii Complete and attach a label to each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.

viii Carefully pack sample containers into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment. Remember to place frozen ice packs into the shipping container. Samples should be kept as close to 4° C (39° F) as possible until arriving at the laboratory. Do not freeze samples.

ix Complete a Chain of Custody form for each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, and the analysis that is required for each sample container.

x Upon shipping/delivering the sample containers, obtain both the signatures of the persons relinquishing and receiving the sample containers.

xi Designate and train personnel to collect, maintain, and ship samples in accordance with the above sample protocols and good laboratory practices.

xii Refer to the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP) for more

information on sampling collection and analysis. See http://www.waterboards.ca.gov/water_issues/programs/swamp/[14]

Table 5. Test Methods, Detection Limits, Reporting Units and Applicable NALs

Parameter	Test Method	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Levels	(LUP Type 3) Receiving Water Monitoring Trigger
pH	Field test with calibrated portable instrument	Type 2 & 3	0.2	pH units	Lower = 6.5 upper = 8.5	Lower = 6.0 upper = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Type 2 & 3	1	NTU	250 NTU	500 NTU
SSC	ASTM Method D 3977-97[15]	Type 3 if Receiving Water Monitoring Trigger is exceeded	5	Mg/L	N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[16] fixed-count of 600 org/sample	Type 3 LUPs > 30 acres	N/A	N/A	N/A	N/A

i. <u>LUP Type 2 & 3 Monitoring Methods</u>

i The LUP Type 2 or 3 discharger's project M&RP shall include a description of the following items:

(1) Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

[14] Additional information regarding SWAMP's QAPrP can be found at: http://www.waterboards.ca.gov/water_issues/programs/swamp/.

[15] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394

[16] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

(2) Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program a copy of the Chain of Custody form used when handling and shipping samples.

(3) Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section M.4.f above.

ii LUP Type 2 & 3 dischargers shall ensure that all sampling and sample preservation be in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. All laboratory analyses shall be conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses shall be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). The LUP discharger shall conduct its own field analysis of pH and may conduct its own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

j. <u>LUP Type 2 & 3 Analytical Methods</u>

LUP Type 2 & 3 dischargers shall refer to Table 5 above for test Methods, detection Limits, and reporting Units.

i **pH**: LUP Type 2 & 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or pH test kit. The LUP discharger shall record pH monitoring results on paper and retain these records in accordance with Section M.4.o, below.

ii **Turbidity**: LUP Type 2 & 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results shall

be recorded in the site log book in Nephelometric Turbidity Units (NTU).

iii **Suspended sediment concentration (SSC)**: LUP Type 3 dischargers exceeding the turbidity Receiving Water Monitoring Trigger, shall perform SSC analysis using ASTM Method D3977-97.

iv **Bioassessment**: LUP Type 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

k. Watershed Monitoring Option

If an LUP Type 2 or 3 discharger is part of a qualified regional watershed-based monitoring program the LUP Type 2 or 3 discharger may be eligible for relief from the monitoring requirements in this Attachment. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program if it determines that the watershed-based monitoring program will provide information to determine each discharger's compliance with the requirements of this General Permit.

l. Particle Size Analysis for Risk Justification

LUP Type 2 & 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

m. NAL Exceedance Report

i In the event that any effluent sample exceeds an applicable NAL, the Regional Water Boards may require LUP Type 2 & 3 dischargers to submit NAL Exceedance Reports.

ii LUP Type 2 & 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

iii LUP Type 2 & 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the exceedance report is filed.

iv LUP Type 2 & 3 dischargers shall include in the NAL Exceedance Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.
(3) Description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

n. Monitoring Records

LUP Type 2 & 3 dischargers shall ensure that records of all storm water monitoring information and copies of all reports (including Annual Reports) required by this General Permit be retained for a period of at least three years. LUP Type 2 & 3 dischargers may retain records off-site and make them available upon request. These records shall include:

i The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge);

ii The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements;

iii The date and approximate time of analyses;

iv The individual(s) who performed the analyses;

v A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and all chain of custody forms;

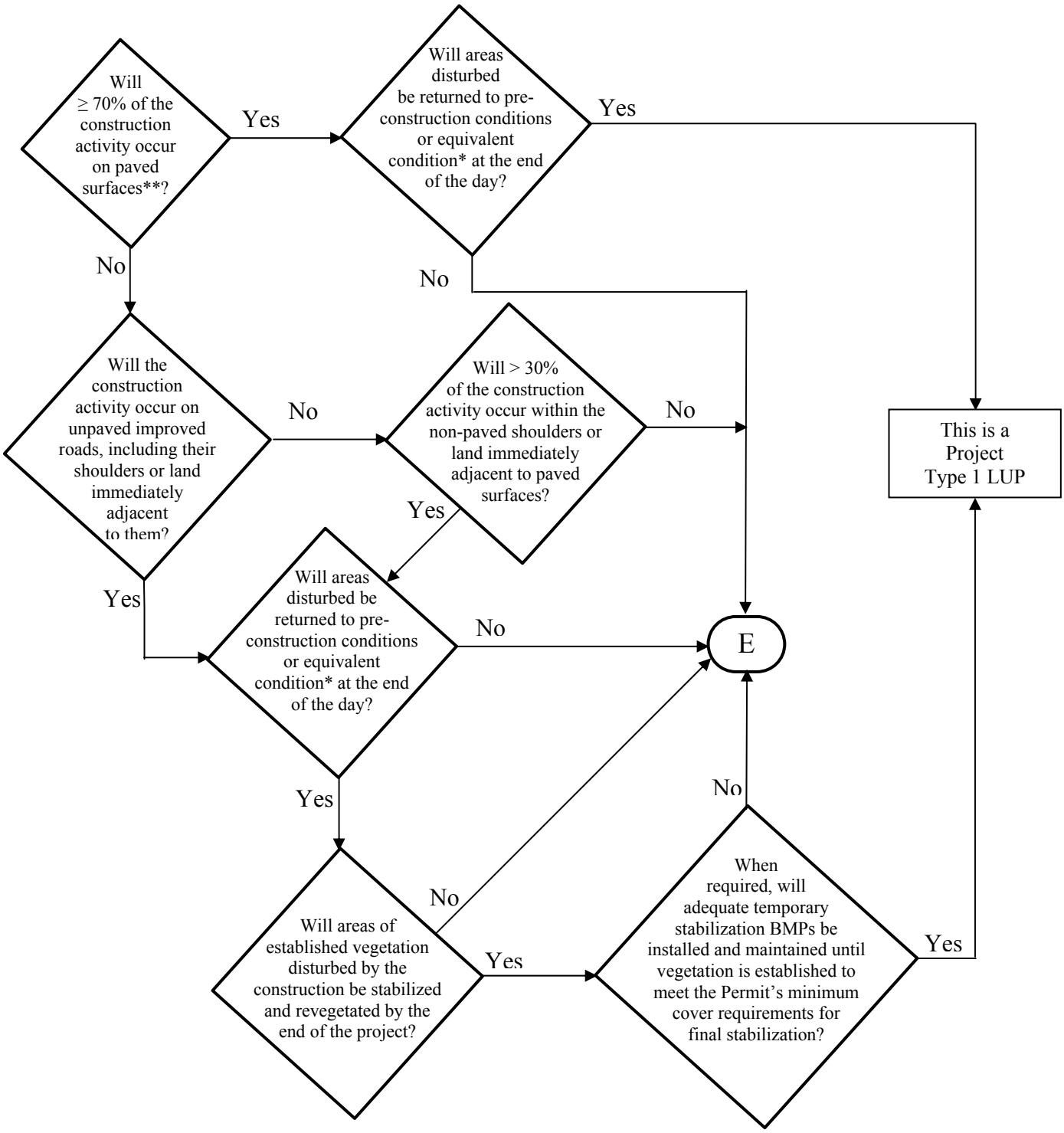
vi Quality assurance/quality control records and results;

vii Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Section M.4.a above);

viii Visual observation and sample collection exception records (see Section M.4.g above); and

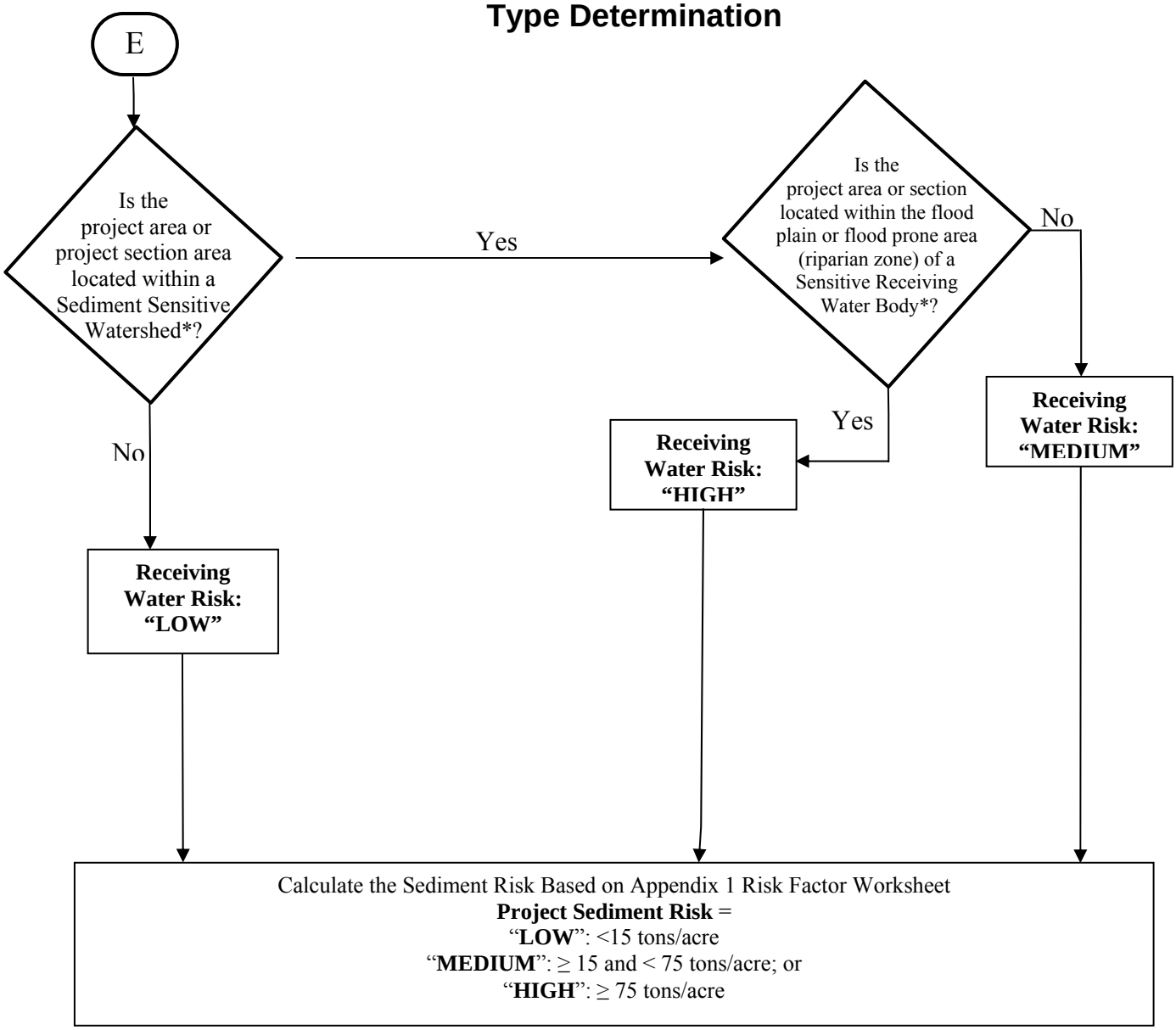
ix The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination



*See Definition of Terms
** Or: "Will < 30% of the soil disturbance occur on unpaved surfaces?

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination



* See Definition of Terms

PROJECT SEDIMENT RISK

RECEIVING WATER RISK	**LOW**	**MEDIUM**	**HIGH**
LOW	Type 1	Type 1	Type 2
MEDIUM	Type 1	Type 2	Type 3
HIGH	Type 2	Type 3	Type 3

2009-0009-DWQ as amended by 2010-0014-DWQ & 2012-0006-DWQ

ATTACHMENT A.1
Definition of Terms

1. **Equivalent Condition** – Means disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.
2. **Linear Construction Activity** – Linear construction activity consists of underground/ overhead facilities that typically include, but are not limited to, any conveyance, pipe or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/ tower pad and cable/ wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/ borrow locations.
3. **Sediment Sensitive Receiving Water Body –** Defined as a water body segment that is listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or is designated with beneficial uses of SPAWN, MIGRATORY, and COLD.
4. **Sediment Sensitive Watershed –** Defined as a watershed draining into a receiving water body listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or a water body designated with beneficial uses of SPAWN, MIGRATORY, and COLD.

ATTACHMENT A.2
PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS FOR LINEAR UNDERGROUND/OVERHEAD PROJECTS TO COMPLY WITH THE CONSTRUCTION GENERAL PERMIT

GENERAL INSTRUCTIONS

Who Must Submit

This permit is effective on July 1, 2010.

The Legally Responsible Person (LRP) for construction activities associated with linear underground/overhead project (LUP) must electronically apply for coverage under this General Permit on or after July 1, 2010. If it is determined that the LUP construction activities require an NPDES permit, the Legally Responsible Person[1] (LRP) shall submit PRDs for this General Permit in accordance with the following:

LUPs associated with Private or Municipal Development Projects

1. For LUPs associated with pre-development and pre-redevelopment construction activities:

   The LRP must obtain coverage[2] under this General Permit for its pre-development and pre-redevelopment construction activities where the total disturbed land area of these construction activities is greater than 1 acre.

2. For LUPs associated with new development and redevelopment construction projects:

   The LRP must obtain coverage under this General Permit for LUP construction activities associated with new development and redevelopment projects where the total disturbed land area of the LUP is greater than 1 acre. Coverage under this permit is not required where the same LUP construction activities are covered by another NPDES permit.

LUPs not associated with private or municipal new development or redevelopment projects:

The LRP must obtain coverage under this General Permit on or after July 1, 2010 for its LUP construction activities where the total disturbed land area is greater than 1 acre.

PRD Submittal Requirements

Prior to the start of construction activities a LRP must submit PRDs and fees to the State Water Board for each LUP.

New and Ongoing LUPs

Dischargers of new LUPs that commence construction activities after the adoption date of this General Permit shall file PRDs prior to the commencement of construction and implement the SWPPP upon the start of construction.

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[1] person possessing the title of the land on which the construction activities will occur for the regulated site
[2] obtain coverage means filing PRDs for the project.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Dischargers of ongoing LUPs that are currently covered under State Water Board Order No. 2003-0007 (Small LUP General Permit) shall electronically file Permit Registration Documents no later than July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 2003-0007-DWQ will be terminated. All existing dischargers shall be exempt from the risk determination requirements in Attachment A. All existing dischargers are therefore subject to LUP Type 1 requirements regardless of their project's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the risk determination requirements in Attachment A.

Where to Apply

The Permit Registration Documents (PRDs) can be found at www.waterboards.ca.gov/water_issues/programs/stormwater/

Fees

The annual fee for storm water permits are established through the State of California Code of Regulations.

When Permit Coverage Commences

To obtain coverage under the General Permit, the LRP must include the complete PRDs and the annual fee. All PRDs deemed incomplete will be rejected with an explanation as to what is required to complete submittal. Upon receipt of complete PRDs and associated fee, each discharger will be sent a waste discharger's identification (WDID) number.

Projects and Activities Not Defined As Construction Activity

1. LUP construction activity does not include routine maintenance projects to maintain original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

    - Maintain the original purpose of the facility, or hydraulic capacity.
    - Update existing lines[3] and facilities to comply with applicable codes, standards and regulations regardless if such projects result in increased capacity.
    - Repairing leaks.

    Routine maintenance does not include construction of new[4] lines or facilities resulting from compliance with applicable codes, standards and regulations.

[3] Update existing lines includes replacing existing lines with new materials or pipes.
[4] New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must acquire new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.

2. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

3. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered small construction activities where all other LUP construction activities associated with the tie-in are covered by a NOI and SWPPP of a third party or municipal agency.

Calculating Land Disturbance Areas of LUPs

The total land area disturbed for LUPs is the sum of the:

- Surface areas of trenches, laterals and ancillary facilities, plus
- Area of the base of stockpiles on unpaved surfaces, plus
- Surface area of the borrow area, plus
- Areas of paved surfaces constructed for the project, plus
- Areas of new roads constructed or areas of major reconstruction to existing roads (e.g. improvements to two-track surfaces or road widening) for the sole purpose of accessing construction activities or as part of the final project, plus
- Equipment and material storage, staging, and preparation areas (laydown areas) not on paved surfaces, plus
- Soil areas outside the surface area of trenches, laterals and ancillary facilities that will be graded, and/or disturbed by the use of construction equipment, vehicles and machinery during construction activities.

Stockpiling Areas

Stockpiling areas, borrow areas and the removal of soils from a construction site may or may not be included when calculating the area of disturbed soil for a site depending on the following conditions:

- For stockpiling of soils onsite or immediately adjacent to a LUP site and the stockpile is not on a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation.

- The surface area of borrow areas that are onsite or immediately adjacent to a project site are to be included in the disturbed area calculation.

- For soil that is hauled offsite to a location owned or operated by the discharger that is not a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

- For soil that is brought to the project from an off-site location owned or operated by the discharger the surface area of the borrow pit is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

- Trench spoils on a paved surface that are either returned to the trench or excavation or hauled away from the project daily for disposal or reuse will not be included in the disturbed area calculation.

If you have any questions concerning submittal of PRDs, please call the State Water Board at (866) 563-3107.

ATTACHMENT B
PERMIT REGISTRATION DOCUMENTS (PRDs) TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY

GENERAL INSTRUCTIONS

A. All Linear Construction Projects shall comply with the PRD requirements in Attachment A.2 of this Order.

B. Who Must Submit

Discharges of storm water associated with construction that results in the disturbance of one acre or more of land must apply for coverage under the General Construction Storm Water Permit (General Permit). Any construction activity that is a part of a larger common plan of development or sale must also be permitted, regardless of size. (For example, if 0.5 acre of a 20-acre subdivision is disturbed by the construction activities of discharger A and the remaining 19.5 acres is to be developed by discharger B, discharger A must obtain a General Storm Water Permit for the 0.5 acre project).

Other discharges from construction activities that are covered under this General Permit can be found in the General Permit Section II.B.

It is the LRP's responsibility to obtain coverage under this General Permit by electronically submitting complete PRDs (Permit Registration Documents).

In all cases, the proper procedures for submitting the PRDs must be completed before construction can commence.

C. Construction Activity Not Covered By This General Permit

Discharges from construction that are not covered under this General Permit can be found in the General Permit Sections II.A &B..

D. Annual Fees and Fee Calculation

Annual fees are calculated based upon the total area of land to be disturbed not the total size of the acreage owned. However, the calculation includes all acres to be disturbed during the duration of the project. For example, if 10 acres are scheduled to be disturbed the first year and 10 in each subsequent year for 5 years, the annual fees would be based upon 50 acres of disturbance. The State Water Board will evaluate adding acreage to an existing Permit Waste Discharge Identification (WDID) number on a case-by-case basis. In general, any acreage to be considered must be contiguous to the permitted land area and the existing

SWPPP must be appropriate for the construction activity and topography of the acreage under consideration. As acreage is built out and stabilized or sold, the Change of Information (COI) form enables the applicant to remove those acres from inclusion in the annual fee calculation. Checks should be made payable to: State Water Board.

The Annual fees are established through regulations adopted by the State Water Board. The total annual fee is the current base fee plus applicable surcharges for all construction sites submitting an NOI, based on the total acreage to be disturbed during the life of the project. Annual fees are subject to change by regulation.

Dischargers that apply for and satisfy the Small Construction Erosivity Wavier requirements shall pay a fee of $200.00 plus an applicable surcharge, see the General Permit Section II.B.7.

E. When to Apply

LRP's proposing to conduct construction activities subject to this General Permit must submit their PRDs prior to the commencement of construction activity.

F. Requirements for Completing Permit Registration Documents (PRDs)

All dischargers required to comply with this General Permit shall electronically submit the required PRDs for their type of construction as defined below.

G. Standard PRD Requirements (All Dischargers)

1. Notice of Intent
2. Risk Assessment (Standard or Site-Specific)
3. Site Map
4. SWPPP
5. Annual Fee
6. Certification

H. Additional PRD Requirements Related to Construction Type

1. Discharger in unincorporated areas of the State (not covered under an adopted Phase I or II SUSMP requirements) and that are not a linear project shall also submit a completed:
   a. Post-Construction Water Balance Calculator (Appendix 2).

2. Dischargers who are proposing to implement ATS shall submit:
   a. Complete ATS Plan in accordance with Attachment F at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation.

b. Certification proof that design done by a professional in accordance with Attachment F.

3. Dischargers who are proposing an alternate Risk Justification:
   a. Particle Size Analysis.

I. Exceptions to Standard PRD Requirements

Construction sites with an R value less than 5 as determined in the Risk Assessment are not required to submit a SWPPP.

J. Description of PRDs

1. Notice of Intent (NOI)

2. Site Map(s) Includes:
   a. The project's surrounding area (vicinity)
   b. Site layout
   c. Construction site boundaries
   d. Drainage areas
   e. Discharge locations
   f. Sampling locations
   g. Areas of soil disturbance (temporary or permanent)
   h. Active areas of soil disturbance (cut or fill)
   i. Locations of all runoff BMPs
   j. Locations of all erosion control BMPs
   k. Locations of all sediment control BMPs
   l. ATS location (if applicable)
   m. Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
   n. Locations of all post-construction BMPs
   o. Locations of storage areas for waste, vehicles, service, loading/unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices

3. **SWPPPs**
   A site-specific SWPPP shall be developed by each discharger and shall be submitted with the PRDs.

4. **Risk Assessment**
   All dischargers shall use the Risk Assessment procedure as describe in the General Permit Appendix 1.

   a. The Standard Risk Assessment includes utilization of the following:
      i. Receiving water Risk Assessment interactive map

ii. EPA Rainfall Erosivity Factor Calculator Website
iii. Sediment Risk interactive map
iv. Sediment sensitive water bodies list

b. The Site-Specific Risk Assessment includes the completion of the hand calculated R value Risk Calculator

5. **Post-Construction Water Balance Calculator**
All dischargers subject to this requirement shall complete the Water Balance Calculator (in Appendix 2) in accordance with the instructions.

6. **ATS Design Document and Certification**
All dischargers using ATS must submit electronically their system design (as well as any supporting documentation) and proof that the system was designed by a qualified ATS design professional (See Attachment F).

To obtain coverage under the General Permit PRDs must be included and completed. If any of the required items are missing, the PRD submittal is considered incomplete and will be rejected. Upon receipt of a complete PRD submittal, the State Water Board will process the application package in the order received and assign a (WDID) number.

Questions?

If you have any questions on completing the PRDs please email stormwater@waterboards.ca.gov or call (866) 563-3107.

ATTACHMENT C
RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.

2. Risk Level 1 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

    a. Inspection date and date the inspection report was written.

    b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

    c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

    d. A description of any BMPs evaluated and any deficiencies noted.

    e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

    f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

    g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

    h. Photographs taken during the inspection, if any.

    i. Inspector's name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
1	X	X		X	X		

1. **Construction Site Monitoring Program Requirements**

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

   a. To demonstrate that the site is in compliance with the Discharge Prohibitions;

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and

d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):

i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 1 – Visual Observation Exemptions**

a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. **Risk Level 1 – Monitoring Methods**

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. **Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

   i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

   ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

   iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. **Risk Level 1 – Non-Visible Pollutant Monitoring Requirements**

   a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

   b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.

   c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.

   d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

   e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[2]

h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. **Risk Level 1 – Particle Size Analysis for Project Risk Justification**

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. **Risk Level 1 – Records**

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

[2] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).

i. Visual observation and sample collection exception records (see Section I.4 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT D
RISK LEVEL 2 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 2 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk level 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 2 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 2 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 2 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly.

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 2 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 2 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain all fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 2 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 2 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 2 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 2 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 2 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 2 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 2 dischargers shall implement effective wind erosion control.

2. Risk Level 2 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 2 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 2 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 2 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

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[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage.
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

5. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

F. Run-on and Run-off Controls

Risk Level 2 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 2 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 2 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 2 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 2 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 2 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any

likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The discharger shall ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

4. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase
   b. Trades active on the construction site during each construction phase
   c. Trade contractor information
   d. Suggested actions for each project phase

5. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number

d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number
f. Trades active on site during Inactive Construction
g. Trade contractor information
h. Suggested actions for inactive construction sites

6. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 2 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
2	X	X	X	X	X	X	

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

   a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs).

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 2 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 2 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 2 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 2 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 2 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 2 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i and c.iii above, Risk Level 2 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 2 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 2 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 2 – Water Quality Sampling and Analysis**

a. Risk Level 2 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 2 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 2 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 2 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

5. **Risk Level 2 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 2 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 2 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 2 dischargers shall ensure that storm water discharge collected and observed represent[4] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 2 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

e. Risk Level 2 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 2 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 “Storm Water Sample Collection and Handling Instructions” below.

6. **Risk Level 2 – Visual Observation and Sample Collection Exemptions**

a. Risk Level 2 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk Level 2 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

[4] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment-laden water even if most water flowing through the fence is clear.

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 2 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 2 – Storm Water Sample Collection and Handling Instructions**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. Risk Level 2 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

c. Risk Level 2 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[5]

8. **Risk Level 2 – Monitoring Methods**

a. Risk Level 2 dischargers shall include a description of the following items in the CSMP:

i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program

[5] Additional information regarding SWAMP's QAPrP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/. QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.

an example Chain of Custody form used when handling and shipping samples.

iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

b. Risk Level 2 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 2 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services. Risk Level 2 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 2 – Analytical Methods**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 2 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 2 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 2 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

10. **Risk Level 2 - Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

   i. Risk Level 2 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

   ii. Risk Level 2 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

   iii. Risk Level 2 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 2 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

b. Effluent Sampling Locations:

   i. Risk Level 2 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

   ii. Risk Level 2 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

   iii. Risk Level 2 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

11. **Risk Level 2 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 2 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual

inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 2 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 2 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 2 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 2 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 2 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 2 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 2 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[6]

h. Risk Level 2 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 2 – Watershed Monitoring Option**

Risk Level 2 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

[6] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

13. **Risk Level 2 – Particle Size Analysis for Project Risk Justification**

Risk Level 2 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 2 – Records**

Risk Level 2 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 2 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections;

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 2 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 2 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

c. Risk Level 2 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 2 dischargers shall include in the NAL Exceedance Report:

   i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

   ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

   iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

Table 3 – Risk Level 2 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level
pH	Field test with calibrated portable instrument	Risk Level 2 Discharges	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 Discharges other than ATS	1	NTU	250 NTU
		For ATS discharges	1	NTU	N/A

ATTACHMENT E
RISK LEVEL 3 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 3 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric –Risk Level 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 3 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 3 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 3 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protecting stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 3 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 3 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinuing the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 3 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 3 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 3 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 3 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 3 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 3 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 3 dischargers shall implement effective wind erosion control.

2. Risk Level 3 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 3 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 3 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

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[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

5. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

8. **Additional Risk Level 3 Requirement:** The Regional Water Board may require Risk Level 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

F. Run-on and Run-off Controls

Risk Level 3 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 3 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 3 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 3 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 3 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 3 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

    a. Inspection date and date the inspection report was written.

    b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

    c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

    d. A description of any BMPs evaluated and any deficiencies noted.

    e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

    f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

    g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

    h. Photographs taken during the inspection, if any.

i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The QSP shall obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address.
   b. Calculated Risk Level (2 or 3).
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.

4. **Additional Risk Level 3 Requirement:** The QSP shall include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase.
   b. Trades active on the construction site during each construction phase.
   c. Trade contractor information.
   d. Suggested actions for each project phase.

5. **Additional Risk Level 3 Requirement:** The QSP shall develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

a. Site Address.
b. Calculated Risk Level (2 or 3).
c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.
f. Trades active on site during Inactive Construction.
g. Trade contractor information.
h. Suggested actions for inactive construction sites.

6. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 3 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
3	X	X	X	X	X	X	X[4]

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Program in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

[4] When receiving water monitoring trigger is exceeded

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 3 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 3 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 3 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 3 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 3 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 3 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i. and c.iii above, Risk Level 3 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 3 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 3 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 3 – Water Quality Sampling and Analysis**

a. Risk Level 3 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 3 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 3 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 3 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

e. Risk 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event.

Receiving Water Monitoring Requirements

f. In the event that a Risk Level 3 discharger's effluent exceeds the daily average receiving water monitoring trigger of 500 NTU turbidity or the daily average pH range 6.0-9.0 contained in this General Permit and has a direct discharge into receiving waters, the Risk Level 3 discharger shall subsequently sample receiving waters (RWs) for turbidity, pH (if applicable), and SSC for the duration of coverage under this General Permit. If a Risk Level 3 discharger utilizing ATS with direct discharges into receiving waters discharges effluent that exceeds the NELs in this permit, the discharger shall subsequently sample RWs for turbidity, pH (if applicable), and SSC for the duration of coverage under this General Permit.

g. Risk Level 3 dischargers disturbing 30 acres or more of the landscape and with direct discharges into receiving waters shall conduct or participate in benthic macroinvertebrate bioassessment of RWs prior to commencement of construction activity (See Appendix 3).

h. Risk Level 3 dischargers shall obtain RW samples in accordance with the Receiving Water sampling location section (Section I.5), below.

5. **Risk Level 3 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 3 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 3 dischargers shall ensure that storm water discharge collected and observed represent[5] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 3 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

e. Risk Level 3 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 3 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 “Storm Water Sample Collection and Handling Instructions” below.

Receiving Water Sampling Locations

h. **Upstream/up-gradient RW samples**: Risk Level 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible and upstream from the effluent discharge point.

i. **Downstream/down-gradient RW samples**: Risk Level 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible and downstream from the effluent discharge point.

j. If two or more discharge locations discharge to the same receiving water, Risk Level 3 dischargers may sample the receiving water at a single upstream and downstream location.

[5] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment-laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment laden water even if most water flowing through the fence is clear.

6. **Risk Level 3 – Visual Observation and Sample Collection Exemptions**

   a. Risk Level 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk Level 3 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

      i. During dangerous weather conditions such as flooding and electrical storms.

      ii. Outside of scheduled site business hours.

   b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 3 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 3 – Storm Water Sample Collection and Handling Instructions**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

   b. Risk Level 3 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

   c. Risk Level 3 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[6]

[6] Additional information regarding SWAMP's QAPrP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf

8. **Risk Level 3 – Monitoring Methods**

   a. Risk Level 3 dischargers shall include a description of the following items in the CSMP:

      i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

      ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

      iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

   b. Risk Level 3 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 3 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). Risk Level 3 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 3 – Analytical Methods**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 3 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

d. **Suspended sediment concentration (SSC)**: Risk Level 3 dischargers that exceed the turbidity Receiving Water Monitoring Trigger shall perform SSC analysis using ASTM Method D3977-97.

e. **Bioassessment**: Risk Level 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

10. **Risk Level 3 - Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

i. Risk Level 3 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

ii. Risk Level 3 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

iii. Risk Level 3 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 3 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to

reduce or prevent pollutants from contacting non-storm water discharges.

b. Effluent Sampling Locations:

i. Risk Level 3 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

ii. Risk Level 3 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

iii. Risk Level 3 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

11. **Risk Level 3 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 3 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 3 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 3 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 3 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 3 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 3 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[7]

h. Risk Level 3 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 3 – Watershed Monitoring Option**

Risk Level 3 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 3 – Particle Size Analysis for Project Risk Justification**

Risk Level 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 3 – Records**

Risk Level 3 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 3 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

[7] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 3 – NAL Exceedance Report**

a. Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity In this General Permit.

c. Risk Level 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 3 dischargers shall include in the NAL Exceedance Report:

   i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

16. **Risk Level 3 – Bioassessment**

a. Risk Level 3 dischargers with a total project-related ground disturbance exceeding 30 acres shall:

i. Conduct bioassessment monitoring, as described in Appendix 3.

ii. Include the collection and reporting of specified in stream biological data and physical habitat.

iii. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).[8]

b. Risk Level 3 dischargers qualifying for bioassessment, where construction commences out of an index period for the site location shall:

i. Receive Regional Board approval for the sampling exception.

ii. Conduct bioassessment monitoring, as described in Appendix 3.

iii. Include the collection and reporting of specified instream biological data and physical habitat.

iv. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).

OR

v. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.

[8] http://www.waterboards.ca.gov/water_issues/programs/swamp/.

vi. Send a copy of the check to the Regional Water Board office for the site's region.

vii. Invest $**7,500.00 X The number of samples required** into the SWAMP program as compensation (upon regional board approval).

Table 3 – Risk Level 3 Test Methods, Detection Limits, Reporting Units and Applicable NALs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level	Numeric Effluent Limitation	Receiving Water Monitoring Trigger
pH	Field test with calibrated portable instrument	Risk Level 3 Discharges	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A	lower limit = 6.0 upper limit = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 3 Discharges other than ATS	1	NTU	250 NTU	N/A	500 NTU
		For ATS discharges	1	NTU	N/A	10 NTU for Daily Weighted Average & 20 NTU for Any Single Sample	10 NTU for Daily Weighted Average & 20 NTU for Any Single Sample
SSC	ASTM Method D 3977-97[9]	Risk Level 3 (if Receiving Water Monitoring Trigger exceeded)	5	mg/L	N/A	N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[10] fixed-count of 600 org/sample	Risk Level 3 projects> 30 acres	N/A	N/A	N/A	N/A	N/A

[9] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394.

[10] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

ATTACHMENT F:
Active Treatment System (ATS) Requirements

Table 1 – Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
Turbidity	EPA 0180.1 and/or field test with a calibrated portable instrument	For ATS discharges	1	NTU	N/A	10 NTU for Daily Flow-Weighted Average & 20 NTU for Any Single Sample

A. Dischargers choosing to implement an Active Treatment System (ATS) on their site shall comply with all of the requirements in this Attachment.

B. The discharger shall maintain a paper copy of each ATS specification onsite in compliance with the record retention requirements in the Special Provisions of this General Permit.

C. ATS Design, Operation and Submittals

1. The ATS shall be designed and approved by a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ); a California registered civil engineer; or any other California registered engineer.

2. The discharger shall ensure that the ATS is designed in a manner to preclude the accidental discharge of settled floc[1] during floc pumping or related operations.

3. The discharger shall design outlets to dissipate energy from concentrated flows.

4. The discharger shall install and operate an ATS by assigning a lead person (or project manager) who has either a minimum of five years construction storm

[1] Floc is defined as a clump of solids formed by the chemical action in ATS systems.

water experience or who is a licensed contractors specifically holding a California Class A Contractors license.[2]

5. The discharger shall prepare an ATS Plan that combines the site-specific data and treatment system information required to safely and efficiently operate an ATS. The ATS Plan shall be electronically submitted to the State Water Board at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation. At a minimum, the ATS Plan shall include:

   a. ATS Operation and Maintenance Manual for All Equipment.

   b. ATS Monitoring, Sampling & Reporting Plan, including Quality Assurance/Quality Control (QA/QC).

   c. ATS Health and Safety Plan.

   d. ATS Spill Prevention Plan.

6. The ATS shall be designed to capture and treat (within a 72-hour period) a volume equivalent to the runoff from a 10-year, 24-hour storm event using a watershed runoff coefficient of 1.0.

D. Treatment – Chemical Coagulation/Flocculation

1. Jar tests shall be conducted using water samples selected to represent typical site conditions and in accordance with ASTM D2035-08 (2003).

2. The discharger shall conduct, at minimum, six site-specific jar tests (per polymer with one test serving as a control) for each project to determine the proper polymer and dosage levels for their ATS.

3. Single field jar tests may also be conducted during a project if conditions warrant, for example if construction activities disturb changing types of soils, which consequently cause change in storm water and runoff characteristics.

E. Residual Chemical and Toxicity Requirements

1. The discharger shall utilize a residual chemical test method that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold

[2] Business and Professions Code Division 3, Chapter 9, Article 4, Class A Contractor: A general engineering contractor is a contractor whose principal contracting business is in connection with fixed works requiring specialized engineering knowledge and skill. [http://www.cslb.ca.gov/General-Information/library/licensing-classifications.asp].

concentration[3] (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used.

2. The discharger shall utilize a residual chemical test method that produces a result within one hour of sampling.

3. The discharger shall have a California State certified laboratory validate the selected residual chemical test. Specifically the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.

4. If the discharger cannot utilize a residual chemical test method that meets the requirements above, the discharger shall operate the ATS in Batch Treatment[4] mode.

5. A discharger planning to operate in Batch Treatment mode shall perform toxicity testing in accordance with the following:

   a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge[5]. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[6]

   b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas* (fathead minnow). Acute toxicity for *Oncorhynchus mykiss* (Rainbow Trout) may be used as a substitute for testing fathead minnows.

   c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

   d. The discharger shall electronically report all acute toxicity testing.

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[3] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:
The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.
[4] Batch Treatment mode is defined as holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full.
[5] This requirement only requires that the test be initiated prior to discharge.
[6] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.

F. Filtration

1. The ATS shall include a filtration step between the coagulant treatment train and the effluent discharge. This is commonly provided by sand, bag, or cartridge filters, which are sized to capture suspended material that might pass through the clarifier tanks.

2. Differential pressure measurements shall be taken to monitor filter loading and confirm that the final filter stage is functioning properly.

G. Residuals Management

1. Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage (i.e., volume) capability.

2. Handling and disposal of all solids generated during ATS operations shall be done in accordance with all local, state, and federal laws and regulations.

H. ATS Instrumentation

1. The ATS shall be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate.

2. The minimum data recorded shall be consistent with the Monitoring and Reporting requirements below, and shall include:

   a. Influent Turbidity

   b. Effluent Turbidity

   c. Influent pH

   d. Effluent pH

   e. Residual Chemical

   f. Effluent Flow rate

   g. Effluent Flow volume

3. Systems shall be equipped with a data recording system, such as data loggers or webserver-based systems, which records each measurement on a frequency no longer than once every 15 minutes.

4. Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days continuous data.

5. Instrumentation systems shall be interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH.

6. The system shall also assure that upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.

7. Instrumentation (flow meters, probes, valves, streaming current detectors, controlling computers, etc.) shall be installed and maintained per manufacturer's recommendations, which shall be included in the QA/QC plan.

8. The QA/QC plan shall also specify calibration procedures and frequencies, instrument method detection limit or sensitivity verification, laboratory duplicate procedures, and other pertinent procedures.

9. The instrumentation system shall include a method for controlling coagulant dose, to prevent potential overdosing. Available technologies include flow/turbidity proportional metering, periodic jar testing and metering pump adjustment, and ionic charge measurement controlling the metering pump.

I. ATS Effluent Discharge

1. ATS effluent shall comply with all provisions and prohibitions in this General Permit, specifically the NELs.

2. NELs for discharges from an ATS:

   a. Turbidity of all ATS discharges shall be less than 10 NTU for daily flow-weighted average of all samples and 20 NTU for any single sample.

   b. Residual Chemical shall be < 10% of MATC[7] for the most sensitive species of the chemical used.

[7] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

3. If an analytical effluent sampling result exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file the results in violation within 24-hours of obtaining the results.

4. If ATS effluent is authorized to discharge into a sanitary sewer system, the discharger shall comply with any pre-treatment requirements applicable for that system. The discharger shall include any specific criteria required by the municipality in the ATS Plan.

5. Compliance Storm Event:

   Discharges of storm water from ATS shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for ATS discharges is the 10 year, 24 hour storm, as determined using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca10y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca10y24.gif

   This exemption is dependent on the submission of rain gauge data verifying the storm event is equal to or larger than the Compliance Storm.

J. Operation and Maintenance Plan

1. Each Project shall have a site-specific Operation and Maintenance (O&M) Manual covering the procedures required to install, operate and maintain the ATS.[8]

2. The O&M Manual shall only be used in conjunction with appropriate project-specific design specifications that describe the system configuration and operating parameters.

3. The O&M Manual shall have operating manuals for specific pumps, generators, control systems,and other equipment.

K. Sampling and Reporting Quality Assurance/ Quality Check (QA/QC) Plan

4. A project-specific QA/QC Plan shall be developed for each project. The QA/QC Plan shall include at a minimum:

   a. Calibration – Calibration methods and frequencies for all system and field instruments shall be specified.

[8] The manual is typically in a modular format covering generalized procedures for each component that is utilized in a particular system.

b. Method Detection Limits (MDLs) – The methods for determining MDLs shall be specified for each residual coagulant measurement method. Acceptable minimum MDLs for each method, specific to individual coagulants, shall be specified.

c. Laboratory Duplicates – Requirements for monthly laboratory duplicates for residual coagulant analysis shall be specified.

L. Personnel Training

1. Operators shall have training specific to using an ATS and liquid coagulants for storm water discharges in California.

2. The training shall be in the form of a formal class with a certificate and requirements for testing and certificate renewal.

3. Training shall include a minimum of eight hours classroom and 32 hours field training. The course shall cover the following topics:

   a. Coagulation Basics –Chemistry and physical processes

   b. ATS System Design and Operating Principles

   c. ATS Control Systems

   d. Coagulant Selection – Jar testing, dose determination, etc.

   e. Aquatic Safety/Toxicity of Coagulants, proper handling and safety

   f. Monitoring, Sampling, and Analysis

   g. Reporting and Recordkeeping

   h. Emergency Response

M. Active Treatment System (ATS) Monitoring Requirements

Any discharger who deploys an ATS on their site shall conduct the following:

1. Visual Monitoring

   a. A designated responsible person shall be on site daily at all times during treatment operations.

b. Daily on-site visual monitoring of the system for proper performance shall be conducted and recorded in the project data log.

   i. The log shall include the name and phone number of the person responsible for system operation and monitoring.

   ii. The log shall include documentation of the responsible person's training.

2. Operational and Compliance Monitoring

   a. Flow shall be continuously monitored and recorded at not greater than 15-minute intervals for total volume treated and discharged.

   b. Influent and effluent pH must be continuously monitored and recorded at not greater than 15-minute intervals.

   c. Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at not greater than 15-minute intervals.

   d. The type and amount of chemical used for pH adjustment, if any, shall be monitored and recorded.

   e. Dose rate of chemical used in the ATS system (expressed in mg/L) shall be monitored and reported 15-minutes after startup and every 8 hours of operation.

   f. Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records shall be maintained onsite.

   g. Effluent shall be monitored and recorded for residual chemical/additive levels.

   h. If a residual chemical/additive test does not exist and the ATS is operating in a batch treatment mode of operation refer to the toxicity monitoring requirements below.

3. Toxicity Monitoring

   A discharger operating in batch treatment mode shall perform toxicity testing in accordance with the following:

   a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge.[9] All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS)

[9] This requirement only requires that the test be initiated prior to discharge.

Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[10]

b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas or* Rainbow trout *Oncorhynchus mykiss* may be used as a substitute for fathead minnow.

c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.[11]

4. Reporting and Recordkeeping

At a minimum, every 30 days a LRP representing the discharger shall access the State Water Boards Storm Water Mulit-Application and Report Tracking system (SMARTS) and electronically upload field data from the ATS. Records must be kept for three years after the project is completed .

5. Non-compliance Reporting

a. Any indications of toxicity or other violations of water quality objectives shall be reported to the appropriate regulatory agency as required by this General Permit.

b. Upon any measurements that exceed water quality standards, the system operator shall immediately notify his supervisor or other responsible parties, who shall notify the Regional Water Board.

c. If any monitoring data exceeds any applicable NEL in this General Permit, the discharger shall electronically submit a NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

i. ATS dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

ii. ATS dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

iii. ATS dischargers shall include in the NEL Violation Report:

[10] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.
[11] http://www.epa.gov/waterscience/methods/wet/.

(1) The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”);

(2) The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

(3) A description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

iv. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, ATS dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Version 8/17/2011												
2		**Risk Determination Worksheet**											
3													
4			**Step 1**	Determine Sediment Risk via one of the options listed:									
5				1. GIS Map Method - EPA Rainfall Erosivity Calculator & GIS map									
6				2. Individual Method - EPA Rainfall Erosivity Calculator & Individual Data									
7			**Step 2**	Determine Receiving Water Risk via one of the options listed:									
8				1. GIS map of Sediment Sensitive Watersheds provided									
9				2. Site Specific Analysis (support documentation required)									
10			**Step 3**	Determine Combined Risk Level									
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		0
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	0	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			
21			
22			
23	**GIS Map Method:**		
24	**1.** The R factor for the project is calculated using the online calculator at:		
25	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
26			
27	**2**. The K and LS factors may be obtained by accessing the GIS maps located on the State Water Board FTP website at:		
28	ftp://swrcb2a.waterboards.ca.gov/pub/swrcb/dwq/cgp/Risk/		
29			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?:	**no**	**Low**
http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml		
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan)		
http://www.waterboards.ca.gov/waterboards_map.shtml		
Region 1 Basin Plan		
Region 2 Basin Plan		
Region 3 Basin Plan		
Region 4 Basin Plan		
Region 5 Basin Plan		
Region 6 Basin Plan		
Region 7 Basin Plan		
Region 8 Basin Plan		
Region 9 Basin Plan		

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

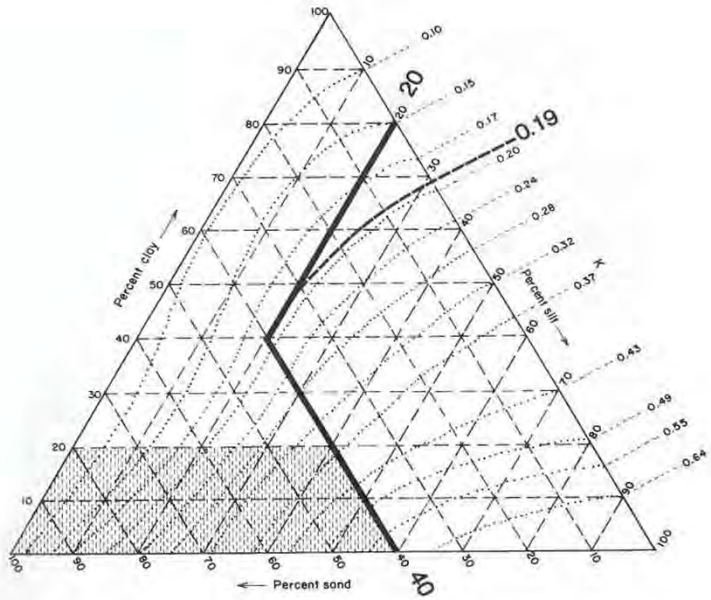
Project Sediment Risk: Low

Project RW Risk: Low

Project Combined Risk: Level 1

Soil Erodibility Factor (K)

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422) be done to determine the percentages of sand, very fine sand, silt and clay. Use the figure below to determine appropriate K value.



Erickson triangular nomograph used to estimate soil erodibility (K) factor.
The figure above is the USDA nomograph used to determine the K factor for a soil, based on its texture (% silt plus very fine sand, % sand, % organic matter, soil structure, and permeability). ***Nomograph from Erickson 1977 as referenced in Goldman et. al., 1986.***

Sheet Flow Length (ft)	Average Watershed Slope (%)																		
	0.2	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**20.0**	**25.0**	**30.0**	**40.0**	**50.0**	**60.0**
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	0.45	0.48	0.53	0.58	0.63
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	0.64	0.72	0.85	0.97	1.07
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	0.80	0.91	1.13	1.31	1.47
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	0.93	1.08	1.37	1.62	1.84
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	1.04	1.24	1.59	1.91	2.19
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	1.56	1.86	2.41	2.91	3.36
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	2.67	3.22	4.24	5.16	5.97
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	3.67	4.44	5.89	7.20	8.37
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	4.59	5.58	7.44	9.13	10.63
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	6.30	7.70	10.35	12.75	14.89
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	7.88	9.67	13.07	16.16	18.92
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	9.38	11.55	15.67	19.42	22.78
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	10.81	13.35	18.17	22.57	26.51
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24	13.53	16.77	22.95	28.60	33.67
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	18.57	23.14	31.89	39.95	47.18
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	23.24	29.07	40.29	50.63	59.93
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	27.66	34.71	48.29	60.84	72.15

LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

APPENDIX 2:
Post-Construction Water Balance Performance Standard Spreadsheet

The discharger shall submit with their Notice of Intent (NOI) the following information to demonstrate compliance with the New and Re-Development Water Balance Performance Standard.

Map Instructions

The discharger must submit a small-scale topographic map of the site to show the existing contour elevations, pre- and post-construction drainage divides, and the total length of stream in each watershed area. Recommended scales include 1 in. = 20 ft., 1 in. = 30 ft., 1 in. = 40 ft., or 1 in = 50 ft. The suggested contour interval is usually 1 to 5 feet, depending upon the slope of the terrain. The contour interval may be increased on steep slopes. Other contour intervals and scales may be appropriate given the magnitude of land disturbance.

Spreadsheet Instructions

The intent of the spreadsheet is to help dischargers calculate the project-related increase in runoff volume and select impervious area and runoff reduction credits to reduce the project-related increase in runoff volume to pre-project levels.

The discharger has the option of using the spreadsheet (**Appendix 2.1)** or a more sophisticated, watershed process-based model (e.g. Storm Water Management Model, Hydrological Simulation Program Fortran) to determine the project-related increase in runoff volume.

In* Appendix 4.1**, ***you must complete the worksheet for each land use/soil type combination for each project sub-watershed.

Steps 1 through 9 pertain specifically to the Runoff Volume Calculator:

Step 1: Enter the county where the project is located in cell H3.

Step 2: Enter the soil type in cell H6.

Step 3: Enter the existing pervious (dominant) land use type in cell H7.

Step 4: Enter the proposed pervious (dominant) land use type in cell H8.

Step 5: Enter the total project site area in cell H11 or J11.

Step 6: Enter the sub-watershed area in cell H12 or J12.

Step 7: Enter the existing rooftop area in cell H17 or J17, the existing non-rooftop impervious area in cell H18 or J18, the proposed rooftop area in cell H19 or J19, and the proposed non-rooftop impervious area in cell H20 or J20

Step 8: Work through each of the impervious area reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Step 9: Work through each of the impervious volume reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Non-structural Practices Available for Crediting

- ***Porous Pavement***
- ***Tree Planting***
- ***Downspout Disconnection***
- ***Impervious Area Disconnection***
- ***Green Roof***
- ***Stream Buffer***
- ***Vegetated Swales***
- ***Rain Barrels and Cisterns***
- ***Landscaping Soil Quality***

Post-Construction Water Balance Calculator

3	User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***		
4				(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO FAA ARPT**		
5	***Project Information***			***Runoff Calculations***			
6	***Project Name:***	***Optional***		(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**	
7	***Waste Discharge Identification (WDID):***	***Optional***		(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Wood & Grass: <50% ground cover***		
8	***Date:***	***Optional***		(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***Lawn, Grass, or Pasture covering more than 75% of the open space***		
9	***Sub Drainage Area Name (from map):***	***Optional***			**Complete Either**		
10	***Runoff Curve Numbers***				**Sq Ft**	**Acres**	**Acres**
11	**Existing Pervious Runoff Curve Number**		**82**	*(Step 5) Total Project Site Area:*		**5.00**	**5.00**
12	**Proposed Development Pervious Runoff Curve Number**		**74**	*(Step 6) Sub-watershed Area:*		**5.00**	**5.00**
13	***Design Storm***			*Percent of total project :*	**100%**		
14	Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.62**	**in**				
15	The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.44**	**In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
16	P used for calculations (in) (the greater of the above two criteria)	**0.62**	**In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**5.00**
17	^Available at www.cabmphandbooks.com			Existing Rooftop Impervious Coverage		**0**	**0.00**
18				Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
19				Proposed Rooftop Impervious Coverage		**0**	**0.00**
20				Proposed Non-Rooftop Impervious Coverage		**0**	**0.00**
21							
22				***Credits***	**Acres**		**Square Feet**
23				Porous Pavement	**0.00**		**0**
24				Tree Planting	**0.00**		**0**
25	**Pre-Project Runoff Volume (cu ft)**	**247**	**Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
26	**Project-Related Runoff Volume Increase w/o credits (cu ft)**	**0**	**Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
27				Green Roof	**0.00**		**0**
28				Stream Buffer	**0.00**		**0**
29				Vegetated Swales	**0.00**		**0**
30	**Project-Related Volume Increase with Credits (cu ft)**	**0**	**Cu.Ft.**	**Subtotal**	**0.00**		**0**
31				**Subtotal Runoff Volume Reduction Credit**	**0 Cu. Ft.**		
32							
33	You have achieved your minimum requirements			***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
34				Rain Barrels/Cisterns	**0 Cu. Ft.**		
35				Soil Quality	**0 Cu. Ft.**		
36				**Subtotal Runoff Volume Reduction**	**0 Cu. Ft.**		
37				**Total Runoff Volume Reduction Credit**	**0 Cu. Ft.**		
38							
39							

Porous Pavement Credit Worksheet

Please fill out a porous pavement credit worksheet for each project sub-watershed.

For the PROPOSED Development:

Proposed Porous Pavement	Runoff Reduction*	Fill in either Acres or SqFt In SqFt.	In Acres	Equivalent Acres
Area of **Brick without Grout** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Brick without Grout** on more than 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.30			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.60			0.00
Area of **Reinforced Grass Pavement** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Reinforced Grass Pavement** on at least 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Porous Gravel Pavement** on less than 12 inches of base with at least 20% void space over soil	0.38			0.00
Area of **Porous Gravel Pavement** on at least 12 inches of base with at least 20% void space over soil	0.75			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with less than 4 inches of gravel base (washed stone)	0.40			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 4 to 8 inches of gravel base (washed stone)	0.60			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 8 to 12 inches of gravel base (washed stone)	0.80			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 12 or more inches of gravel base (washed stone)	1.00			0.00

*=1-Rv**

Return to Calculator

**Using Site Design Techniques to meet Development Standards for Stormwater Quality (BASMAA 2003)

**NCDENR Stormwater BMP Manual (2007)

Tree Planting Credit Worksheet

Please fill out a tree canopy credit worksheet for each project sub-watershed.

Tree Canopy Credit Criteria	Number of Trees Planted	Credit (acres)
Number of proposed evergreen trees to be planted (credit = number of trees x 0.005)*	0	0.00
Number of proposed deciduous trees to be planted (credit = number of trees x 0.0025)*		0.00
	Square feet Under Canopy	
Square feet under an existing tree canopy, that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is LESS than 12 in diameter.		0.00
Square feet under an existing tree canopy that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is 12 in diameter or GREATER.		0.00
Please describe below how the project will ensure that these trees will be maintained.		

0

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* credit amount based on credits from Stormwater Quality Design Manual for the Sacramento and South Placer Regions

Downspout Disconnection Credit Worksheet

Please fill out a downspout disconnection credit worksheet for each project subwatershed. If you answer yes to all questions, all rooftop area draining to each downspout will be subtracted from your proposed rooftop impervious coverage.

Downspout Disconnection Credit Criteria					
Do downspouts and any extensions extend at least six feet from a basement and two feet from a crawl space or concrete slab?				○ Yes	◉ No
Is the area of rooftop connecting to each disconnected downspout 600 square feet or less?				○ Yes	◉ No
Is the roof runoff from the design storm event fully contained in a raised bed or planter box or does it drain as sheet flow to a landscaped area large enough to contain the roof runoff from the design storm event?				○ Yes	◉ No
The Stream Buffer and/or Vegetated Swale credits **will not** be taken in this sub-watershed area?				○ Yes	◉ No
Percentage of existing	0.00	Acres	of rooftop surface has disconnected downspouts		
Percentage of the proposed	0.00	Acres	of rooftop surface has disconnected downspouts	50	
				Return to Calculator	

Impervious Area Disconnection Credit Worksheet

Please fill out an impervious area disconnection credit worksheet for each project sub-watershed. If you answer yes to all questions, all non-rooftop impervious surface area will be subtracted from your proposed non-rooftop impervious coverage.

Non-Rooftop Disconnection Credit Criteria	Response
Is the maximum contributing impervious flow path length less than 75 feet or, if equal or greater than 75 feet, is a storage device (e.g. French drain, bioretention area, gravel trench) implemented to achieve the required disconnection length?	◉ Yes ○ No
Is the impervious area to any one discharge location less than 5,000 square feet?	◉ Yes ○ No
The Stream Buffer credit **will not** be taken in this sub-watershed area?	◉ Yes ○ No

Percentage of existing	0.00	Acres non-rooftop surface area disconnected	
Percentage of the proposed	0.00	Acres non-rooftop surface area disconnected	70

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Green Roof Credit Worksheet

Please fill out a greenroof credit worksheet for each project sub-watershed. If you answer yes to all questions, 70% of the greenroof area will be subtracted from your proposed rooftop impervious coverage.

Green Roof Credit Criteria	Response
Is the roof slope less than 15% or does it have a grid to hold the substrate in place until it forms a thick vegetation mat?	◉ Yes ○ No
Has a professional engineer assessed the necessary load reserves and designed a roof structure to meet state and local codes?	◉ Yes ○ No
Is the irrigation needed for plant establishment and/or to sustain the green roof during extended dry periods, is the source from stored, recycled, reclaimed, or reused water?	◉ Yes ○ No
Percentage of existing 0.00 Acres rooftop surface area in greenroof	
Percentage of the proposed 0.00 Acres rooftop surface area in greenroof	

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Stream Buffer Credit Worksheet

Please fill out a stream buffer credit worksheet for each project sub-watershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout and/or Impervious Area Disconnection credits.

Stream Buffer Credit Criteria				Response
Does runoff enter the floodprone width* or within 500 feet (whichever is larger) of a stream channel as sheet flow**?				○ Yes ◉ No
Is the contributing overland slope 5% or less, or if greater than 5%, is a level spreader used?				○ Yes ◉ No
Is the buffer area protected from vehicle or other traffic barriers to reduce compaction?				○ Yes ◉ No
Will the stream buffer be maintained in an ungraded and uncompacted condition and will the vegetation be maintained in a natural condition?				○ Yes ◉ No
Percentage of existing	0.00	Acres	impervious surface area draining into a stream buffer:	
Percentage of the proposed	0.00	Acres	impervious surface area that will drain into a stream buffer:	
Please describe below how the project will ensure that the buffer areas will remain in ungraded and uncompacted condition and that the vegetation will be maintained in a natural condition.				

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* floodprone width is the width at twice the bankfull depth.
** the maximum contributing length shall be 75 feet for impervious area

Vegetated Swale Credit Worksheet

Please fill out a vegetated swale worksheet for each project subwatershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout Disconnection credit.

Vegetated Swale Credit Criteria

Have all vegetated swales been designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com)?	○ Yes ◉ No
Is the maximum flow velocity for runoff from the design storm event less than or equal to 1.0 foot per second?	○ Yes ◉ No

Percentage of existing	0.00	Acres of impervious area draining to a vegetated swale	
Percentage of the proposed	0.00	Acres of impervious area draining to a vegetated swale	

Return to Calculator

Rain Barrel/Cistern Credit Worksheet

Please fill out a rain barrel/cistern worksheet for each project sub-watershed.

Rain Barrel/Cistern Credit Criteria	Response
Total number of rain barrel(s)/cisterns	
Average capacity of rain barrel(s)/cistern(s) (in gallons)	
Total capacity rain barrel(s)/cistern(s) (in cu ft) [1]	0

[1] accounts for 10% loss

Return to Calculator

Please fill out a soil quality worksheet for each project sub-watershed.

	Response
Will the landscaped area be lined with an impervious membrane?	
Will the soils used for landscaping meet the ideal bulk densities listed in Table 1 below? [1]	○ Yes ◉ No
If you answered yes to the question above, and you know the area-weighted bulk density within the top 12 inches for soils used for landscaping (in g/cm^3)* , fill in the cell to the right and skip to cell G11. If not select from the drop-down menu in G10.	1.3
If you answered yes to the question above, but you do not know the exact bulk density, which of the soil types in the drop down menu to the right best describes the top 12 inches for soils used for landscaping (in g/cm^3).	Sandy loams, loams
What is the average depth of your landscaped soil media meeting the above criteria (inches)?	12
What is the total area of the landscaped areas meeting the above criteria (in acres)?	2.97

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Table 1

Sands, loamy sands	<1.6
Sandy loams, loams	<1.4
Sandy clay loams, loams, clay loams	<1.4
Silts, silt loams	<1.3
Silt loams, silty clay loams	<1.1
Sandy clays, silty clays, some clay loams (35-45% clay)	<1.1
Clays (>45% clay)	<1.1

[1] USDA NRCS. "Soil Quality Urban Technical Note No.2-Urban Soil Compaction". March 2000. http://soils.usda.gov/sqi/management/files/sq_utn_2.pdf

* To determine how to calculate density see: http://www.globe.gov/tctg/bulkden.pdf?sectionID=94

Porosity (%) 50.94%

Mineral grains in many soils are mainly quartz and feldspar, so 2.65 a good average for particle density. To determine percent porosity, use the formula: Porosity (%) = (1-Bulk Density/2.65) X 100

APPENDIX 3
Bioassessment Monitoring Guidelines

Bioassessment monitoring is required for projects that meet all of the following criteria:

1. The project is rated Risk Level 3 or LUP Type 3
2. The project directly discharges runoff to a freshwater wadeable stream (or streams) that is either: (a) listed by the State Water Board or USEPA as impaired due to sediment, and/or (b) tributary to any downstream water body that is listed for sediment; and/or have the beneficial use SPAWN & COLD & MIGRATORY
3. Total project-related ground disturbance exceeds 30 acres.

For all such projects, the discharger shall conduct bioassessment monitoring, as described in this section, to assess the effect of the project on the biological integrity of receiving waters.
Bioassessment shall include:

1. The collection and reporting of specified instream biological data
2. The collection and reporting of specified instream physical habitat data

<u>Bioassessment Exception</u>
If a site qualifies for bioassessment, but construction commences out of an index period for the site location, the discharger shall:

1. Receive Regional Water Board approval for the sampling exception
2. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.
3. Send a copy of the check to the Regional Water Board office for the site's region
4. Invest **7,500.00 X The number of samples required** into the SWAMP program as compensation (upon Regional Water Board approval).
5. Conduct bioassessment monitoring, as described in Appendix 4
6. Include the collection and reporting of specified instream biological data and physical habitat
7. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP)

<u>Site Locations and Frequency</u>
Macroinvertebrate samples shall be collected both before ground disturbance is initiated and after the project is completed. The "after" sample(s) shall be collected after at least one winter season resulting in surface runoff has transpired after project-related ground disturbance has ceased. "Before" and "after" samples shall be collected both upstream and downstream of the project's

discharge. Upstream samples should be taken immediately before the sites outfall and downstream samples should be taken immediately after the outfall (when safe to collect the samples). Samples should be collected for each freshwater wadeable stream that is listed as impaired due to sediment, or tributary to a water body that is listed for sediment. Habitat assessment data shall be collected concurrently with all required macroinvertebrate samples.

Index Period (Timing of Sample Collection)
Macroinvertebrate sampling shall be conducted during the time of year (i.e., the "index period") most appropriate for bioassessment sampling, depending on ecoregion. This map is posted on the State Water Board's Website: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Field Methods for Macroinvertebrate Collections
In collecting macroinvertebrate samples, the discharger shall use the "Reachwide Benthos (Multi-habitat) Procedure" specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007).[1]

Physical - Habitat Assessment Methods
The discharger shall conduct, concurrently with all required macroinvertebrate collections, the "Full" suite of physical habitat characterization measurements as specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007), and as summarized in the Surface Water Ambient Monitoring Program's *Stream Habitat Characterization Form — Full Version*.

Laboratory Methods
Macroinvertebrates shall be identified and classified according to the Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT),[2] and using a fixed-count of 600 organisms per sample.

Quality Assurance
The discharger or its consultant(s) shall have and follow a quality assurance (QA) plan that covers the required bioassessment monitoring. The QA plan shall include, or be supplemented to include, a specific requirement for external QA checks (i.e., verification of taxonomic identifications and correction of data where

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[1] This document is available on the Internet at: ~~http://www.swrcb.ca.gov/swamp/docs/phab_sopr6.pdf~~. http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_bioassessment_collection_020107.pdf.

[2] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: ~~http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf~~ http://www.safit.org/Docs/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

errors are identified). External QA checks shall be performed on one of the discharger's macroinvertebrate samples collected per calendar year, or ten percent of the samples per year (whichever is greater). QA samples shall be randomly selected. The external QA checks shall be paid for by the discharger, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent or better expertise and performance may be used if approved in writing by State Water Board staff.

Sample Preservation and Archiving

The original sample material shall be stored in 70 percent ethanol and retained by the discharger until: 1) all QA analyses specified herein and in the relevant QA plan are completed; and 2) any data corrections and/or re-analyses recommended by the external QA laboratory have been implemented. The remaining subsampled material shall be stored in 70 percent ethanol and retained until completeness checks have been performed according to the relevant QA plan. The identified organisms shall be stored in 70 percent ethanol, in separate glass vials for each final ID taxon. (For example, a sample with 45 identified taxa would be archived in a minimum of 45 vials, each containing all individuals of the identified taxon.) Each of the vials containing identified organisms shall be labeled with taxonomic information (i.e., taxon name, organism count) and collection information (i.e., site name/site code, waterbody name, date collected, method of collection). The identified organisms shall be archived (i.e., retained) by the discharger for a period of not less than three years from the date that all QA steps are completed, and shall be checked at least once per year and "topped off" with ethanol to prevent desiccation. The identified organisms shall be relinquished to the State Water Board upon request by any State Water Board staff.

Data Submittal

The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) shall be submitted to the State Water Board in electronic format. The State Water Board's Surface Water Ambient Monitoring Program (SWAMP) is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available shall be submitted using the SWAMP formats. Until those formats are available, the biological data shall be submitted in MS-Excel (or equivalent) format.[3]

The physical/habitat data shall be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.[4]

[3] Any version of Excel, 2000 or later, may be used.
[4] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Invasive Species Prevention

In conducting the required bioassessment monitoring, the discharger and its consultants shall take precautions to prevent the introduction or spread of aquatic invasive species. At minimum, the discharger and its consultants shall follow the recommendations of the California Department of Fish and Game to minimize the introduction or spread of the New Zealand mudsnail.[5]

[5] Instructions for controlling the spread of NZ mudsnails, including decontamination methods, can be found at: http://www.dfg.ca.gov/invasives/mudsnail/
More information on AIS More information on AIS
http://www.waterboards.ca.gov/water_issues/programs/swamp/ais/

Appendix 4 Non Sediment TMDLs

Region 1 Lost River-DIN and CBOD

Region 1 Source: Cal Trans Construction TMDL Completion Date: 12 30 2008 TMDL Type: River, Lake Watershed Area= 2996 mi^2	**Pollutant Stressors/WLA**	
	Dissolved inorganic nitrogen (DIN) (metric tons/yr)	**Carbonaceous biochemical oxygen demand (CBOD) (metric tons/yr)**
Lost River from the Oregon border to Tule Lake	.1	.2
Tule Lake Refuge	.1	.2
Lower Klamath Refuge	.1	.2

Region 2 San Francisco Bay-Mercury

Region 2 Source:Non-Urban Stormwater Runoff TMDL Type: Bay	**Name**	**Pollutant Stressor/WLA**	**TMDL Completion Date**
	San Francisco Bay	Mercury 25 kg/year	08 09 2006

Region 4 Ballona Creek-Metals and Selenium

Region 4 Source: NPDES General Construction TMDL Completion Date: 12 22 2005 TMDL Type: Creek	**Pollutant Stressors/WLA**							
	Copper (Cu)		**Lead (Pb)**		**Selenium (Se)**		**Zinc (Zn)**	
	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre
Ballona Creek	4.94E-07 x Daily storm volume (L)	2.20E-10 x Daily storm volume (L)	1.62E-06 x Daily storm volume (L)	7.20E-10 x Daily storm volume (L)	1.37E-07 x Daily storm volume (L)	6.10E-11 x Daily storm volume (L)	3.27E-06 x Daily storm volume (L)	1.45E-09 x Daily storm volume (L)

2009-0009-DWQ as amended by 2010-0014-DWQ & 2012-0006-DWQ

General Construction Storm Water Permits:
Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed-specific general permit developed by the Regional Board.

- Dry-weather Implementation Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:
  (1) infeasible to eliminate
  (2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
  (3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.
  Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.
- Wet-weather Implementation Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Region 4 Calleaguas Creek-OC Pesticides, PCBs, and Siltation

Interim Requirements

Region 4 Calleaguas Creek Source: Minor NPDES point sources/WDRs TMDL Completion Date: 3 14 2006 TMDL Type:Creek	**Pollutant Stressor**	**WLA Daily Max (µg/L)**	**WLA Monthly Ave (µg/L)**
	Chlordane	1.2	0.59
	4,4-DDD	1.7	0.84
	4,4-DDE	1.2	0.59
	4,4-DDT	1.2	0.59
	Dieldrin	0.28	0.14
	PCB's	0.34	0.17
	Toxaphene	0.33	0.16

Final WLA (ng/g)							
Region 4 Calleaguas Creek Source: Stormwater Permittees TMDL Completion Date: 3 14 2006 TMDL Type:Creek	Chlordane	4,4-DDD	4,4-DDE	4,4-DDT	Dieldrin	PCB's	Toxaphene
Mugu Lagoon*	3.3	2.0	2.2	0.3	4.3	180.0	360.0
Callegaus Creek	3.3	2.0	1.4	0.3	0.2	120.0	0.6
Revolon Slough (SW)*	0.9	2.0	1.4	0.3	0.1	130.0	1.0
Arroyo Las posas(SW)*	3.3	2.0	1.4	0.3	0.2	120.0	0.6
Arroyo Simi	3.3	2.0	1.4	0.3	0.2	120.0	0.6
Conejo Creek	3.3	2.0	1.4	0.3	0.2	120.0	0.6
Interim Requirements (ng/g)							
Mugu Lagoon*	25.0	69.0	300.0	39.0	19.0	180.	22900.0
Callegaus Creek	17.0	66.0	470.0	110.0	3.0	3800.0	260.0
Revolon Slough (SW)*	48.0	400.0	1600.0	690.0	5.7	7600.0	790.0
Arroyo Las posas(SW)*	3.3	290.0	950.0	670.0	1.1	25700.0	230.0
Arroyo Simi	3.3	14.0	170.0	25.0	1.1	25700.0	230.0
Conejo Creek	3.4	5.3	20.0	2.0	3.0	3800.0	260.0

*(SW)=Subwatershed
*Mugu Lagoon includes Duck pond/Agricultural Drain/Mugu/Oxnard Drain #2
Compliance with sediment based WLAs is measured as an instream annual average at the base of each subwatershed where the discharges are located.

Region 4 Calleguas Creek-Salts

Final Dry Weather Pollutant WLA (mg/L)					
Region 4 Calleaguas Creek Source Permitted Stormwater Dischargers TMDL Completion Date: 12 2 2008 TMDL Type:Creek	**Critical Condition Flow Rate (mgd)**	**Chloride (lb/day)**	**TDS (lb/day)**	**Sulfate (lb/day)**	**Boron (lb/day)**
Simi	1.39	1738.0	9849.0	2897.0	12.0
Las Posas	0.13	157.0	887.0	261.0	N/A
Conejo	1.26	1576.0	8931.0	2627.0	N/A

2009-0009-DWQ as amended by 2010-0014-DWQ & 2012-0006-DWQ

Camarillo	0.06	72.0	406.0	119.0	N/A
Pleasant Valley (Calleguas)	0.12	150.0	850.0	250.0	N/A
Pleasant Valley (Revolon)	0.25	314.0	1778.0	523.0	2.0

Dry Weather Interim Pollutant WLA (mg/L)				
	Chloride (mg/L)	**TDS (mg/L)**	**Sulfate (mg/L)**	**Boron (mg/L)**
Simi	230.0	1720.0	1289.0	1.3
Las Posas	230.0	1720.0	1289.0	1.3
Conejo	230.0	1720.0	1289.0	1.3
Camarillo	230.0	1720.0	1289.0	1.3
Pleasant Valley (Calleguas)	230.0	1720.0	1289.0	1.3
Pleasant Valley (Revolon)	230.0	1720.0	1289.0	1.3

- General Construction permittees are assigned a dry weather wasteload allocation equal to the average dry weather critical condition flow rate multiplied by the numeric target for each constituent. Waste load allocations apply in the receiving water at the base of each subwatershed. Dry weather allocations apply when instream flow rates are below the 86th percentile flow and there has been no measurable precipitation in the previous 24 hours.
- Because wet weather flows transport a large mass of salts at low concentrations, these dischargers meet water quality objectives during wet weather.
- Interim limits are assigned for dry weather discharges from areas covered by NPDES stormwater permits to allow time to implement appropriate actions. The interim limits are assigned as concentration based receiving water limits set to the 95th percentile of the discharger data as a monthly average limit except for chloride. The 95th percentile for chloride was 267 mg/L which is higher than the recommended criteria set forth in the Basin Plan for protection of sensitive beneficial uses including aquatic life. Therefore, the interim limit for chloride for Permitted Stormwater Dischargers is set equal to 230 mg/L to ensure protection of sensitive beneficial uses in the Calleguas Creek watershed.

Region 4 San Gabriel River and Tributaries-Metals and Selenium

Region 4 San Gabriel River and Tributaries Source: Construction Stormwater Dischargers TMDL Completion Date: 3 2007 TMDL Type: Creek	**Pollutant Stressor**	**Wet weather Allocations**	**Dry Weather Allocations**	**% of Watershed**

San Gabriel Reach 2	Lead (Pb)	0.7% * 166 µg/l * Daily Storm Vol	N/A	0.7%
San Gabriel Reach 2	Lead (Pb) Mass based	0.8 kg/d	N/A	0.7%
Coyote Creek	Copper (Cu)	0.285 kg/d	0	5.0%
Coyote Creek	Lead (Pb)	1.70 kg/d	N/A	5.0%
Coyote Creek	Zinc (Zn)	2.4 kg/d	N/A	5.0%
San Jose Creek Reach 1 and 2	Selenium	5 µg/L	5 µg/L	5.0%

Wet-weather allocations for lead in San Gabriel River Reach 2. Concentration-based allocations apply to non-stormwater NPDES discharges. Stormwater allocations are expressed as a percent of load duration curve. Mass-based values presented in table are based on a flow of 260 cfs (daily storm volume = 6.4 $x10^8$ liters).

There are 1555 acres of water in the entire watershed, 37.4 acres of water in the Reach 1 subwatershed (2.4%), and 269 acres in the Coyote Creek subwatershed (17%).

General Construction Storm Water Permits

Waste load allocations for the general construction storm water permits may be incorporated into the State Board general permit upon renewal or into a watershed-specific general permit developed by the Regional Board. An estimate of direct atmospheric deposition is developed based on the percent area of surface water in the watershed. Approximately 0.4% of the watershed area draining to San Gabriel River Reach 2 is comprised of water and approximately 0.2% of the watershed area draining to Coyote Creek is comprised of water.

Region 4 The Harbor Beaches of Ventura County-Bacteria

The TMDL has a multi-part numeric target based on the bacteriological water quality objectives for marine water to protect the water contact recreation use. These targets are the most appropriate indicators of public health risk in recreational waters. Bacteriological objectives are set forth in Chapter 3 of the Basin Plan. The objectives are based on four bacteria indicators and include both geometric mean limits and single sample limits. The Basin Plan objectives that serve as the numeric targets for this TMDL are:

The General NPDES Construction permit is seen as a minor contributor and is given no allocation

General NPDES permits, individual NPDES permits, the Statewide Industrial Storm Water General Permit, the Statewide Construction Activity Storm Water General Permit, and WDR permittees in the Channel Islands Harbor subwatershed are assigned WLAs of zero (0) days of allowable exceedances for all three time periods and for the single sample limits and the rolling 30-day geometric mean. Any future enrollees under a general NPDES permit, individual NPDES permit, the Statewide Industrial Storm Water General Permit, the Statewide Construction Activity Storm Water General Permit, and WDR will also be subject to a WLA of zero (0) days of allowable exceedances.

Region 4 Resolution No. 03-009 Los Angeles River and Tributaries-Nutrients

Minor Point Sources
Waste loads are allocated to minor point sources enrolled under NPDES or WDR permits including but not limited to Tapia WRP, Whittier Narrows WRP, Los Angeles Zoo WRP, industrial and construction stormwater, and municipal storm water and urban runoff from municipal separate storm sewer systems (MS4s)

Region 4 Minor Point Sources for NPDES/WDR Permits TMDL Completion Date: 7 10 2003 TMDL Type: River	Pollutant Stressor/WLA				
	Total Ammonia (NH_3)		**Nitrate-nitrogen (NO_3-N)**	**Nitrite-nitrogen (NO_2-N)**	**NO_3-N + NO_3-N**
	1 Hr Ave mg/l	30 Day Ave mg/l	30 Day Ave mg/l		30 Day Ave mg/l
LA River Above Los Angeles-Glendale WRP (LAG)	4.7	1.6	8.0	1.0	8.0
LA River Below LAG	8.7	2.4	8.0	1.0	8.0
Los Angeles Tributaries	10.1	2.3	8.0	1.0	8.0

Malibu Creek Attachment A to Resolution No. 2004-019R-Bacteria

12 13 2004 The WLAs for permittees under the NPDES General Stormwater Construction Permit are zero (0) days of allowable exceedances for all three time periods and for the single sample limits and the rolling 30-day geometric mean.

Region 4 Marina del Rey Harbor, Mothers' Beach and Back Basins

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Attachment A to Resolution No. 2003-012-Bacteria

8 7 2003 As discussed in "Source Analysis", discharges from general NPDES permits, general industrial storm water permits and general construction storm water permits are not expected to be a significant source of bacteria. Therefore, the WLAs for these discharges are zero (0) days of allowable exceedances for all three time periods and for the single sample limits and the rolling 30-day geometric mean. Any future enrollees under a general NPDES permit, general industrial storm water permit or general construction storm water permit within the MdR Watershed will also be subject to a WLA of zero days of allowable exceedances.

Region 4 San Gabriel River and Tributaries-Metals and Selenium

Dry Weather Selenium WLA
A zero WLA is assigned to the industrial and construction stormwater permits during dry weather. Non-storm water discharges are already prohibited or restricted by existing general permits.

Region 4 General Construction Permittees TMDL Completion Date: 7 13 2006 TMDL Type: River	**Total Recoverable Metals (kg/day)**		
	Copper (Cu) Kg/day	**Lead (Pb) Kg/day**	**Zinc (Zn) Kg/day**
San Gabriel River Reach 2 and upstream reaches/tributaries	**XXXX**	Daily storm volume x 1.24 µg/L	**XXXX**
Coyote Creek and Tributaries	Daily storm volume x 0.7 µg/L	Daily storm volume x 4.3 µg/L	Daily storm volume x 6.2 µg/L

Each enrollee under the general construction stormwater permit receives a WLA on a per acre basis

Region 4 General Construction Permittees TMDL Completion Date: 7 13 2006 TMDL Type: River	**Total Recoverable Metals (kg/day/acre)**		
	Copper (Cu) Kg/acre/day	**Lead (Pb) Kg/acre/day**	**Zinc (Zn) Kg/acre/day**
San Gabriel River Reach 2 and upstream reaches/tributaries	**XXXX**	Daily storm volume x 0.56 µg/L	**XXXX**

Coyote Creek and Tributaries	Daily storm volume x 0.12 µg/L	Daily storm volume x 0.70 µg/L	Daily storm volume x 1.01 µg/L

For the general industrial and construction storm water permits, the daily storm volume is measured at USGS station 11085000 for discharges to Reach 2 and above and at LACDPW flow gauge station F354-R for discharges to Coyote Creek.

General construction storm water permits
WLAs will be incorporated into the State Board general permit upon renewal or into a watershed-specific general permit developed by the Regional Board.
Dry-weather implementation
Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (NPDES Permit No. CAS000002), or any successor permit, are exempt from the dry-weather WLA equal to zero as long as they comply with the provisions of sections C.3.and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be (1) infeasible to eliminate (2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and (3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order. Unauthorized non-storm water flows are already prohibited by Permit No. CAS000002.

Upon permit issuance, renewal, or re-opener
Non-storm water flows not authorized by Order No. 99-08 DWQ, or any successor order, shall achieve dry-weather WLAs. WLAs shall be expressed as NPDES water quality-based effluent limitations specified in accordance with federal regulations and state policy on water quality control. Effluent limitations may be expressed as permit conditions, such as the installation, maintenance, and monitoring of Regional Board-approved BMPs.

Six years from the effective date of the TMDL
The construction industry will submit the results of wet-weather BMP effectiveness studies to the Los Angeles Regional Board for consideration. In the event that no effectiveness studies are conducted and no BMPs are approved, permittees shall be subject to site-specific BMPs and monitoring to demonstrate BMP effectiveness.

Seven years from the effective date of the TMDL
The Los Angeles Regional Board will consider results of the wet weather BMP effectiveness studies and consider approval of BMPs.

Eight years from the effective date of the TMDL
All general construction storm water permittees shall implement Regional Board-approved BMPs.

Region 8 RESOLUTION NO. R8-2007- 0024

Total Maximum Daily Loads (TMDLs) for San Diego Creek,
Upper and Lower Newport Bay, Orange County, California

Region 8 NPDES Construction Permit TMDL Completion Date: 1 24 1995 TMDL Type: River. Cr, Bay	Organochlorine Compounds							
	Total DDT		**Chlordane**		**Total PCBs**		**Toxaphene**	
	g/day	g/yr	g/day	g/yr	g/day	g/yr	g/day	g/yr
San Diego Creek	.27	99.8	**.18***	**64.3***	**.09***	**31.5***	.004	1.5
Upper Newport Bay	.11	40.3	.06	23.4	.06	23.2	**X**	**X**
Lower Newport Bay	.04	14.9	.02	8.6	.17	60.7	**X**	**X**

*Red= Informational WLA only, not for enforcement purposes

Organochlorine Compounds TMDLs Implementation Tasks and Schedule

Regional Board staff shall develop a SWPPP Improvement Program that identifies the Regional Board's expectations with respect to the content of SWPPPs, including documentation regarding the selection and implementation of BMPs, and a sampling and analysis plan. The Improvement Program shall include specific guidance regarding the development and implementation of monitoring plans, including the constituents to be monitored, sampling frequency and analytical protocols. The SWPPP Improvement Program shall be completed by (*the date of OAL approval of this BPA*). ***No later than two months*** from completion of the Improvement Program, Board staff shall assure that the requirements of the Program are communicated to interested parties, including dischargers with existing authorizations under the General Construction Permit. Existing, authorized dischargers shall revise their project SWPPPs as needed to address the Program requirements as soon as possible but ***no later than (three months of completion of the SWPPP Improvement Program)***. Applicable SWPPPs that do not adequately address the Program requirements shall be considered inadequate and enforcement by the Regional Board shall proceed accordingly. The Caltrans and Orange County MS4 permits shall be revised as needed to assure that the permittees communicate the Regional Board's SWPPP expectations, based on the SWPPP Improvement Program, with the Standard Conditions of Approval.

Appendix 4 Sediment TMDLs

Implemented Sediment TMDLs in California. Construction was listed as a source in all fo these TMDLs in relation to road construction. Although construction was mentioned as a source, it was not given a specific allocation amount. The closest allocation amount would be for the road activity management WLA. **Implementation Phase** – Adoption process by the Regional Board, the State Water Resources Control Board, the Office of Administrative Law, and the US Environmental Protection Agency completed and TMDL being implemented.

A. Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.albionfinaltmdl	R	Albion River	Sedimentation	Road Construction	2001	43 acres	See A (table 6)

B Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-middle.mainSed.temp	R	Middle Main Eel River and Tributaries (from Dos Rios to the South Fork)	Sedimentation	Road Construction	2005-2006	521 mi^2	100

C Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelRsouth.sed.temp	R	South Fork Eel River	Sedimentation	Road Construction	12 1999	See chart	473

D Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.bigfinaltmdl	R	Big River	Sedimentation	Road Construction	12 2001	181 mi^2 watershed drainage	TMDL = loading capacity = nonpoint sources + background =

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							393 t mi2 yr

E Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-lower.Sed.temp-121807-signed	R	Lower Eel River	Sedimentation	Road Construction	12 2007	300 square-mile watershed	898

F Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-middle.Sed.temp-	R	Middle Fork Eel River	Sedimentation	Road Construction	12 2003	753 mi^2 (approx. 482,000 acres)	82

G Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres Mi^2	WLA tons mi^2 yr
1 R1.epa.EelRnorth-Sed.temp.final-121807-signed	R	North Fork Eel River	Sedimentation	Road Construction	12 30 2002	289 (180,020 acres)	20

H Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres Mi^2	WLA tons mi^2 yr
1 R1.epa.EelR-upper.mainSed.temp-	R	Upper Main Eel River and Tributaries (including Tomki Creek, Outlet Creek and Lake Pillsbury)	Sedimentation	Road Construction	12 29 2004	688 (approx. 440,384 acres)	14

I Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.gualalafinaltmdl	R	Gualala River	Sedimentation	Road Construction	Not sure	300 (191,145 acres)	7

J Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.Mad-sed.turbidity	R	Mad River	Sedimentation	Road Construction	12 21 2007	480	174

K Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.mattole.sediment	R	Mattole River	Sedimentation	Road Construction	12 30 2003	296	27 or 520+27 = 547

L Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.navarro.sed.temp	R	Navarro River	Sedimentation	Road Construction	Not sure	315 (201,600 acres).	50

M Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.noyo.sediment	R	Noyo River	Sedimentation	Road Construction	12 16 1999	113 (72,323 acres)	68 (three areas measured) Table 16 in the TMDL

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N Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.RedwoodCk.sed	Cr	Redwood Creek	Sedimentation	Road Construction	12 30 1998	278	1900 Total allocation

O Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA – Roads tons mi^2 yr
1 R1.epa.tenmile.sed	R	Ten Mile River	Sedimentation	Road Construction	2000	120	9

P Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA management tons mi^2 yr
1 R1.epa.trinity.sed	R	Trinity River	Sedimentation	Road Construction	12 20 2001	2000 of 3000 covered in this TMDL	See rows below
1	Cr	Horse Linto Creek	Sedimentation	Road Construction	12 20 2001	64	528
1	Cr	Mill creek and Tish Tang	Sedimentation	Road Construction	12 20 2001	39	210
1	Cr	Willow Creek	Sedimentation	Road Construction	12 20 2001	43	94
1	Cr	Campbell Creek and Supply Creek	Sedimentation	Road Construction	12 20 2001	11	1961
1	Cr	Lower Mainstem and Coon Creek	Sedimentation	Road Construction	12 20 2001	32	63
1	R	Reference	Sedimentation	Road	12 20 2001	434	24

		Subwatershed [1]		Construction			
1	Cr	Canyon Creek	Sedimentation	Road Construction	12 20 2001	64	326
1	R	Upper Tributaries[2]	Sedimentation	Road Construction	12 20 2001	72	67
1	R	Middle Tributaries[3]	Sedimentation	Road Construction	12 20 2001	54	53
1	R	Lower Tributaries[4]	Sedimentation	Road Construction	12 20 2001	96	55
1	Cr	Weaver and Rush Creeks	Sedimentation	Road Construction	12 20 2001	72	169
1	Cr	Deadwood Creek Hoadley Gulch Poker Bar	Sedimentation	Road Construction	12 20 2001	47	68
1	L	Lewiston Lake	Sedimentation	Road Construction	12 20 2001	25	49
1	Cr	Grassvalley Creek	Sedimentation	Road Construction	12 20 2001	37	44
1	Cr	Indian Creek	Sedimentation	Road Construction	12 20 2001	34	81
1	Cr	Reading and Browns Creek	Sedimentation	Road Construction	12 20 2001	104	66
1	Cr	Reference Subwatersheds[5]	Sedimentation	Road Construction	12 20 2001	235	281
1	L, Cr	Westside tributaries[6]	Sedimentation	Road Construction	12 20 2001	93	105
1	R, Cr, G	Upper trinity[7]	Sedimentation	Road Construction	12 20 2001	161	690
1	R, Cr, G	East Fork Tributaries[8]	Sedimentation	Road Construction	12 20 2001	115	65

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1	R, L	Eastside Tributaries[9]	Sedimentation	Road Construction	12 20 2001	89	60

1 New River, Big French, Manzanita, North Fork, East Fork, North Fork
2 Dutch, Soldier, Oregon gulch, Conner Creek
3 Big Bar, Prairie Creek, Little French Creek
4 Swede, Italian, Canadian, Cedar Flat, Mill, McDonald, Hennessy, Quimby, Hawkins, Sharber
5 Stuarts Fork, Swift Creek, Coffee Creek
6 Stuart Arm, Stoney Creek, Mule Creek, East Fork, Stuart Fork, West Side Trinity Lake, Hatchet Creek, Buckeye Creek,
7 Upper Trinity River, Tangle Blue, Sunflower, Graves, Bear Upper Trinity Mainstream, Ramshorn Creek, Ripple Creek, Minnehaha Creek, Snowslide Gulch, Scorpion Creek
8 East Fork Trinity, Cedar Creek, Squirrel Gulch
9 East Side Tributaries, Trinity Lake

Q Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.trinity.so.sed	R, Cr	South Fork Trinity River and Hayfork Creek	Sedimentation	Road Construction	12 1998	Not given, 19 miles long	33 (road total)

R Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.vanduzen.sed	R, Cr	Van Duzen River and Yager Creek	Sedimentation	Various	12 16 1999	429	1353 total allocation
1		Upper Basin	Sedimentation	Road Construction			7
1		Middle Basin	Sedimentation	Road Construction			22
1		Lower Basin	Sedimentation	Road Construction			20

S Region	**Type**	**Name**	**Pollutant Stressor**	**Potential**	**TMDL**	**Watershed**	**WLA** tons mi^2

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				Sources	**Completion Date**	**Acres** mi^2	yr
6 R6.blackwood.sed	Cr	Blackwood Creek (Placer County)	Bedded Sediment	Various	9 2007	11	17272 total

T Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.SquawCk.sed	R	Squaw Creek (Placer County)	Sedimentation /controllable sources	Various – basin plan amendment	4 13 2006	8.2	10,900

Adopted TMDLs for Construction Sediment Sources

Region	Type	Name	Pollutant Stressor	Potential Sources	**TMDL Completion Date**	**Watershed Area** mi^2	Waste load Allocation tons mi^2 yr
8	R	Newport Bay San Diego Creek Watershed	Sedimentation	Construction Land Development	1999	2.24 (1432 acres)	125,000 tons per Year (no more than 13,000 tons per year from construction sites)

APPENDIX 5:
Glossary

Active Areas of Construction
All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas are still considered active areas until final stabilization is complete. [The construction activity Phases used in this General Permit are the Preliminary Phase, Grading and Land Development Phase, Streets and Utilities Phase, and the Vertical Construction Phase.]

Active Treatment System (ATS)
A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.

Acute Toxicity Test
A chemical stimulus severe enough to rapidly induce a negative effect; in aquatic toxicity tests, an effect observed within 96 hours or less is considered acute.

Air Deposition
Airborne particulates from construction activities.

Approved Signatory
A person who has been authorized by the Legally Responsible Person to sign, certify, and electronically submit Permit Registration Documents, Notices of Termination, and any other documents, reports, or information required by the General Permit, the State or Regional Water Board, or U.S. EPA. The Approved Signatory must be one of the following:

1. For a corporation or limited liability company: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation or limited liability company; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

3. For a municipality, State, Federal, or other public agency: a principal executive officer, ranking elected official, city manager, council president, or any other authorized public employee with managerial responsibility over the

construction or land disturbance project (including, but not limited to, project manager, project superintendent, or resident engineer);

4. For the military: any military officer or Department of Defense civilian, acting in an equivalent capacity to a military officer, who has been designated;

5. For a public university: an authorized university official;

6. For an individual: the individual, because the individual acts as both the Legally Responsible Person and the Approved Signatory; or

7. For any type of entity not listed above (e.g. trusts, estates, receivers): an authorized person with managerial authority over the construction or land disturbance project.

Beneficial Uses
As defined in the California Water Code, beneficial uses of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Best Available Technology Economically Achievable (BAT)
As defined by USEPA, BAT is a technology-based standard established by the Clean Water Act (CWA) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)
As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, oil and grease.

Best Professional Judgment (BPJ)
The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.

Best Management Practices (BMPs)
BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures,

and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Chain of Custody (COC)
Form used to track sample handling as samples progress from sample collection to the analytical laboratory. The COC is then used to track the resulting analytical data from the laboratory to the client. COC forms can be obtained from an analytical laboratory upon request.

Coagulation
The clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development
Generally a contiguous area where multiple, distinct construction activities may be taking place at different times under one plan. A plan is generally defined as any piece of documentation or physical demarcation that indicates that construction activities may occur on a common plot. Such documentation could consist of a tract map, parcel map, demolition plans, grading plans or contract documents. Any of these documents could delineate the boundaries of a common plan area. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based CEQA or NEPA documents that identify potential projects for an agency or facility are not considered common plans of development.

Daily Average Discharge
The discharge of a pollutant measured during any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged during the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) the daily discharge is calculated as the average measurement of the pollutant throughout the day (40 CFR 122.2). In the case of pH, the pH must first be converted from a log scale.

Debris
Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge
A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff.

Discharger
The Legally Responsible Person (see definition) or entity subject to this General Permit.

Dose Rate (for ATS)
In exposure assessment, dose (e.g. of a chemical) per time unit (e.g. mg/day), sometimes also called dosage.

Drainage Area
The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent
Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation
Any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion
The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs
Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements
Testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization
All soil disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

First Order Stream
Stream with no tributaries.

Flocculants
Substances that interact with suspended particles and bind them together to form flocs.

Good Housekeeping BMPs
BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading Phase (part of the Grading and Land Development Phase)
Includes reconfiguring the topography and slope including; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; land form grading; and stockpiling of select material for capping operations.

Hydromodification
Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Identified Organisms
Organisms within a sub-sample that is specifically identified and counted.

Inactive Areas of Construction
Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Index Period
The period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers. Instream communities naturally vary over the course of a year,and sampling during the index period ensures that samples are collected during a time frame when communities are stable so that year-to-year consistency is obtained. The index period approach provides a cost-effective alternative to year-round sampling. Furthermore, sampling within the appropriate index period will yield results that are comparable to the assessment thresholds or criteria for a given region, which are established for the same index period. Because index periods differ for different parts of the state, it is essential to know the index period for your area.

K Factor
The soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). It represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person
The Legally Responsible Person (LRP) will typically be the project proponent. The categories of persons or entities that are eligible to serve as the LRP are set forth below. For any construction or land disturbance project where multiple persons or entities are eligible to serve as the LRP, those persons or entities

shall select a single LRP. In exceptional circumstances, a person or entity that qualifies as the LRP may provide written authorization to another person or entity to serve as the LRP. In such a circumstance, the person or entity that provides the authorization retains all responsibility for compliance with the General Permit. Except as provided in category 2(d), a contractor who does not satisfy the requirements of any of the categories below is not qualified to be an LRP.

The following persons or entities may serve as an LRP:

1. A person, company, agency, or other entity that possesses a real property interest (including, but not limited to, fee simple ownership, easement, leasehold, or other rights of way) in the land upon which the construction or land disturbance activities will occur for the regulated site.

2. In addition to the above, the following persons or entities may also serve as an LRP:

   a. For linear underground/overhead projects, the utility company, municipality, or other public or private company or agency that owns or operates the LUP;

   b. For land controlled by an estate or similar entity, the person who has day-to-day control over the land (including, but not limited to, a bankruptcy trustee, receiver, or conservator);

   c. For pollution investigation and remediation projects, any potentially responsible party that has received permission to conduct the project from the holder of a real property interest in the land; or

   d. For U.S. Army Corp of Engineers projects, the U.S. Army Corps of Engineers may provide written authorization to its bonded contractor to serve as the LRP, provided, however, that the U.S. Army Corps of Engineers is also responsible for compliance with the general permit, as authorized by the Clean Water Act or the Federal Facilities Compliance Act.

Likely Precipitation Event
Any weather pattern that is forecasted to have a 50% or greater chance of producing precipitation in the project area. The discharger shall obtain likely precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

Maximum Allowable Threshold Concentration (MATC)
The allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity

testing conducted by an independent, third-party laboratory. A typical MATC would be:

The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Natural Channel Evolution
The physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once they pass though the suite of evolution stages, they will rest in a new state of equilibrium.

Non-Storm Water Discharges
Discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-Visible Pollutants
Pollutants associated with a specific site or activity that can have a negative impact on water quality, but cannot be seen though observation (ex: chlorine). Such pollutants being discharged are not authorized.

Numeric Action Level (NAL)
Level is used as a warning to evaluate if best management practices are effective and take necessary corrective actions. Not an effluent limit.

Original Sample Material
The material (i.e., macroinvertebrates, organic material, gravel, etc.) remaining after the subsample has been removed for identification.

pH
Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs
Structural and non-structural controls which detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Preliminary Phase (Pre-Construction Phase - Part of the Grading and Land Development Phase)
Construction stage including rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Project

Qualified SWPPP Developer
Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner
Individual assigned responsibility for non-storm water and storm water visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

Qualifying Rain Event
Any event that produces 0.5 inches or more precipitation with a 48 hour or greater period between rain events.

R Factor
Erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Rain Event Action Plan (REAP)
Written document, specific for each rain event, that when implemented is designed to protect all exposed portions of the site within 48 hours of any likely precipitation event.

Remaining Sub sampled Material
The material (e.g., organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan)

Routine Maintenance
Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs
Measures used to divert runon from offsite and runoff within the site.

Run-on
Discharges that originate offsite and flow onto the property of a separate project site.

Revised Universal Soil Loss Equation (RUSLE)
Empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Sampling and Analysis Plan
Document that describes how the samples will be collected, under what conditions, where and when the samples will be collected, what the sample will be tested for, what test methods and detection limits will be used, and what methods/procedures will be maintained to ensure the integrity of the sample during collection, storage, shipping and testing (i.e., quality assurance/quality control protocols).

Sediment
Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation
Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs
Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Settleable Solids (SS)
Solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume (mL/L) or a mass (mg/L) concentration.

Sheet Flow
Flow of water that occurs overland in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

Soil Amendment
Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by storm water.

Streets and Utilities Phase
Construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvements.

Structural Controls
Any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution

Suspended Sediment Concentration (SSC)
The measure of the concentration of suspended solid material in a water sample by measuring the dry weight of all of the solid material from a known volume of a collected water sample. Results are reported in mg/L.

Total Suspended Solids (TSS)
The measure of the suspended solids in a water sample includes inorganic substances, such as soil particles and organic substances, such as algae, aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity
The adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity
The cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU).

Vertical Construction Phase
The Build out of structures from foundations to roofing, including rough landscaping.

Waters of the United States
Generally refers to surface waters, as defined by the federal Environmental Protection Agency in 40 C.F.R. § 122.2.[1]

Water Quality Objectives (WQO)
Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

[1] The application of the definition of "waters of the United States" may be difficult to determine; there are currently several judicial decisions that create some confusion. If a landowner is unsure whether the discharge must be covered by this General Permit, the landowner may wish to seek legal advice.

APPENDIX 6:
Acronym List

ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BASMAA	Bay Area Storm water Management Agencies Association
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPJ	Best Professional Judgment
CAFO	Confined Animal Feeding Operation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities
CIWQS	California Integrated Water Quality System
CKD	Cement Kiln Dust
COC	Chain of Custody
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTB	Cement Treated Base
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
DADMAC	Diallyldimethyl-ammonium chloride
DDNR	Delaware Department of Natural Resources
DFG	Department of Fish and Game
DHS	Department of Health Services
DWQ	Division of Water Quality
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
HSPF	Hydrologic Simulation Program Fortran
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person
LUP	Linear Underground/Overhead Projects

MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limits
MRR	Monitoring and Reporting Requirements
MS4	Municipal Separate Storm Sewer System
MUSLE	Modified Universal Soil Loss Equation
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NICET	National Institute for Certification in Engineering Technologies
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
PAC	Polyaluminum chloride
PAM	Polyacrylamide
PASS	Polyaluminum chloride Silica/sulfate
POC	Pollutants of Concern
PoP	Probability of Precipitation
POTW	Publicly Owned Treatment Works
PRDs	Permit Registration Documents
PWS	Planning Watershed
QAMP	Quality Assurance Management Plan
QA/QC	Quality Assurance/Quality Control
REAP	Rain Event Action Plan
Regional Board	Regional Water Quality Control Board
ROWD	Report of Waste Discharge
RUSLE	Revised Universal Soil Loss Equation
RW	Receiving Water
SMARTS	Storm water Multi Application Reporting and Tracking System
SS	Settleable Solids
SSC	Suspended Sediment Concentration
SUSMP	Standard Urban Storm Water Mitigation Plan
SW	Storm Water
SWARM	Storm Water Annual Report Module
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
TC	Treatment Control
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USACOE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDID	Waste Discharge Identification Number
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation
WET	Whole Effluent Toxicity
WRCC	Western Regional Climate Center
WQBEL	Water Quality Based Effluent Limitation
WQO	Water Quality Objective
WQS	Water Quality Standard

APPENDIX 7:
State and Regional Water Resources Control Board Contacts

NORTH COAST REGION (1)
5550 Skylane Blvd, Ste. A
Santa Rose, CA 95403
(707) 576-2220 FAX: (707)523-0135

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2640

CENTRAL COAST REGION (3)
895 Aerovista Place, Ste 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640

CENTRAL VALLEY REGION (5S)
11020 Sun Center Dr., #200
Rancho Cordova, CA 95670-6114
(916) 464-3291 FAX: (916) 464-4645

FRESNO BRANCH OFFICE (5F)
1685 E St.
Fresno, CA 93706
(559) 445-5116 FAX: (559) 445-5910

REDDING BRANCH OFFICE (5R)
364 Knollcrest Drive, Ste. 205
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271

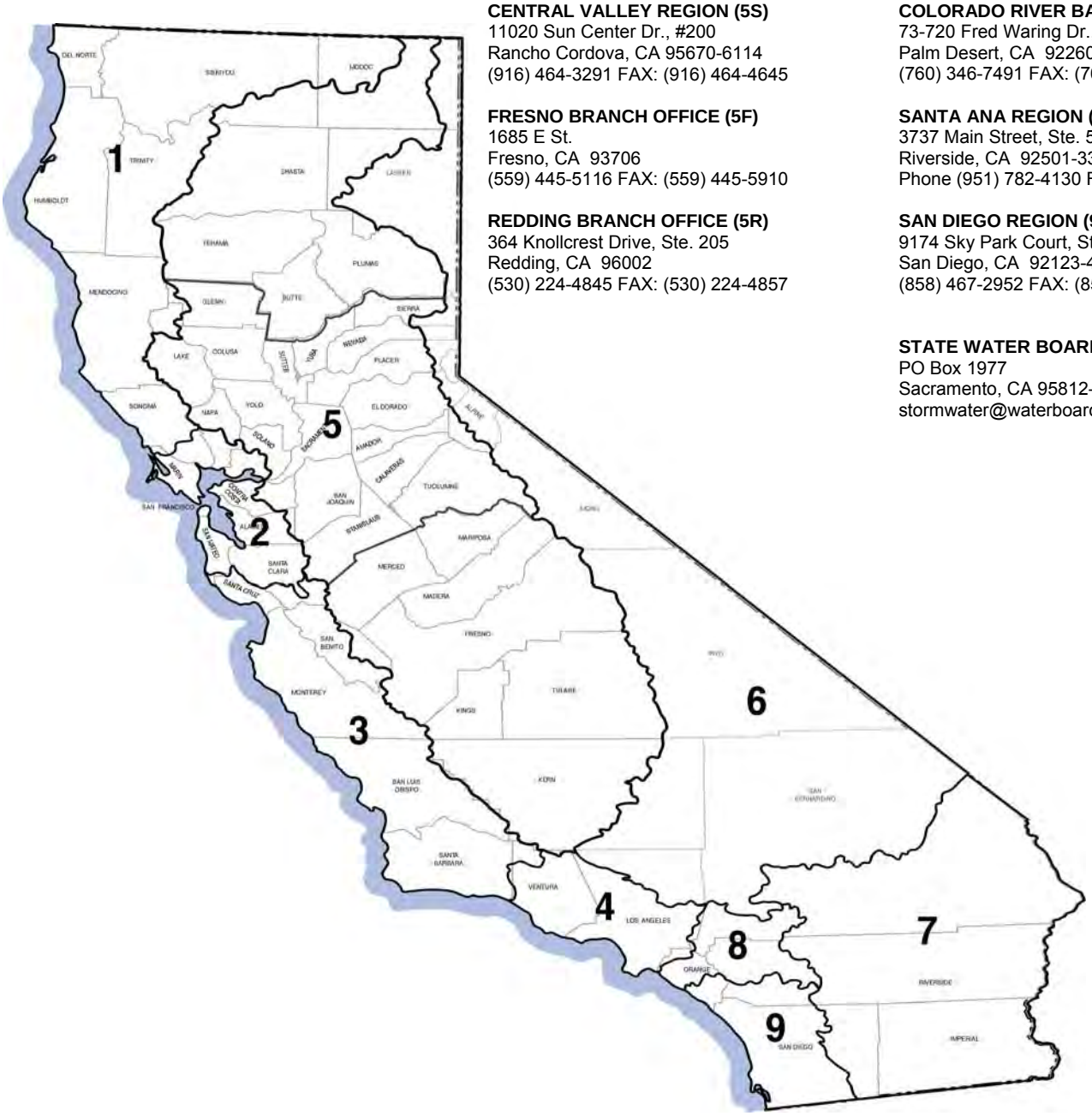
VICTORVILLE OFFICE (6V)
14440 Civic Drive, Ste. 200
Victorville, CA 92392-2383
(760) 241-6583 FAX: (760) 241-7308

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820

SANTA ANA REGION (8)
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
Phone (951) 782-4130 FAX: (951) 781-6288

SAN DIEGO REGION (9)
9174 Sky Park Court, Ste. 100
San Diego, CA 92123-4340
(858) 467-2952 FAX: (858) 571-6972

STATE WATER BOARD
PO Box 1977
Sacramento, CA 95812-1977
stormwater@waterboards.ca.gov



APPENDIX B. SUBMITTED PERMIT REGISTRATION DOCUMENTS

APPENDIX C. SWPP AMENDMENT LOG

Appendix C – SWPPP Amendment Log

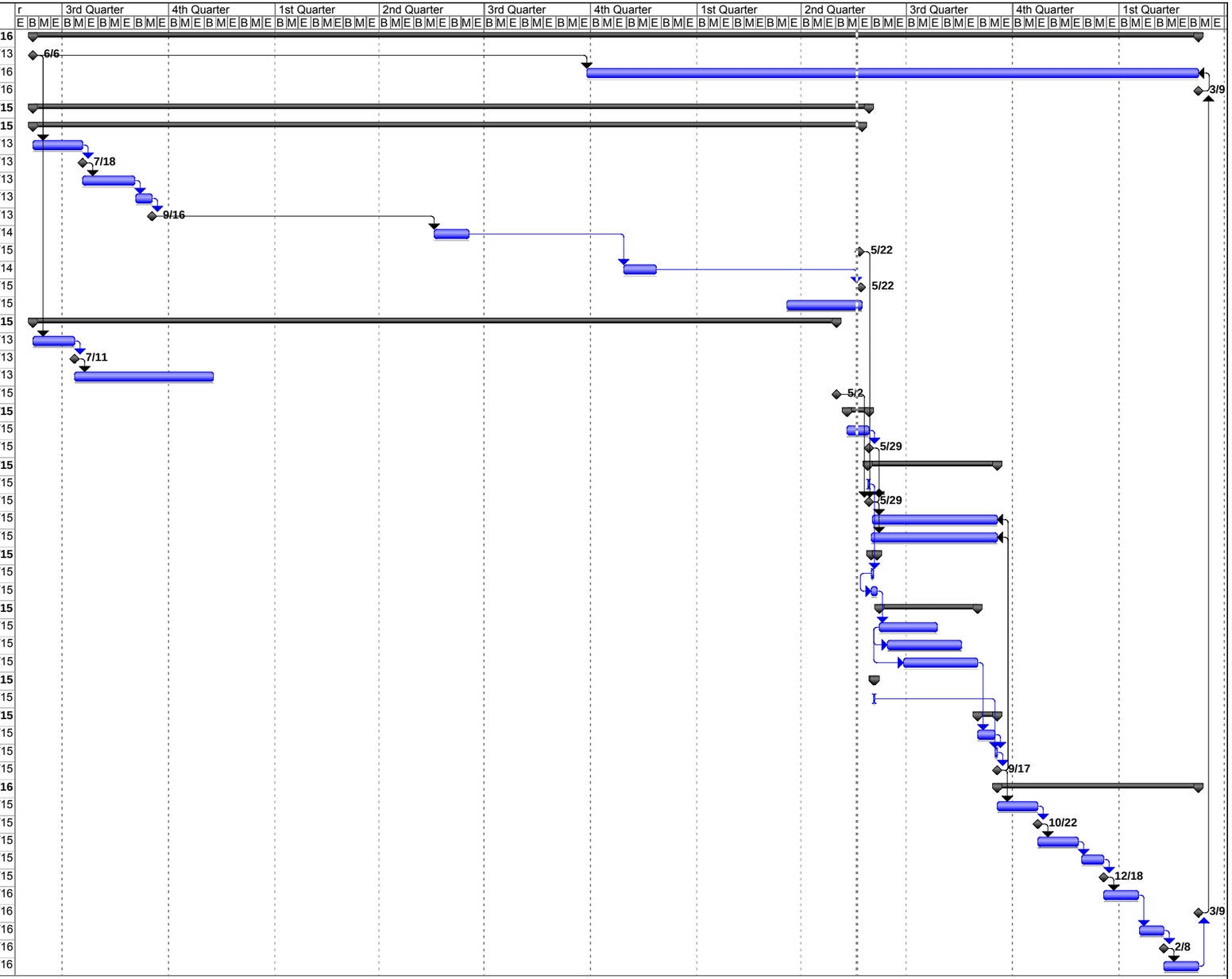
Project Name: RCRA Interim Corrective Measure Soil Removal UXO 1 (SWMU 77), Naval Activity Puerto Rico (NAPR), Ceiba, PR

Amendment No.	Date of Amendment	Amendment (Request By)	Location and Reason for Proposed Change	A Description of the Original BMP (if any) and New BMP Proposed	QSD Responsible for Correction

APPENDIX D. SUBMITTED CHANGES TO PRDs

APPENDIX E. CONSTRUCTION SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**Project Management and Admin**	**1008 days**	**Thu 6/6/13**	**Wed 3/9/16**
2	NTP / Project Start	0 days	Thu 6/6/13	Thu 6/6/13
3	Project Management	529 days	Sun 9/28/14	Wed 3/9/16
4	Project Finish	0 days	Wed 3/9/16	Wed 3/9/16
5	**Work Plans**	**723 days**	**Thu 6/6/13**	**Fri 5/29/15**
6	**Corrective Measures Work Plan**	**717 days**	**Thu 6/6/13**	**Sat 5/23/15**
7	Prepare Draft	30 days	Thu 6/6/13	Thu 7/18/13
8	Submit Draft	0 days	Thu 7/18/13	Thu 7/18/13
9	Navy RPM Review of Draft	45 days	Fri 7/19/13	Sun 9/1/13
10	Address Comments and Prepare Draft Final	10 days	Tue 9/3/13	Mon 9/16/13
11	Submit Draft Final	0 days	Mon 9/16/13	Mon 9/16/13
12	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Draft Final	30 days	Mon 5/19/14	Tue 6/17/14
13	Navy RPM, BRAC PMO, USEPA, and PREQB Approval	0 days	Fri 5/22/15	Fri 5/22/15
14	Address Comments and Prepare Final	20 days	Thu 10/30/14	Wed 11/26/14
15	Submit Final	0 days	Fri 5/22/15	Fri 5/22/15
16	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Final	65 days	Fri 3/20/15	Sat 5/23/15
17	**Explosive Safety Plan**	**695 days**	**Thu 6/6/13**	**Sat 5/2/15**
18	Prepare Draft	25 days	Thu 6/6/13	Thu 7/11/13
19	Submit Draft	0 days	Thu 7/11/13	Thu 7/11/13
20	Navy RPM, BRAC PMO, and NOSSA Review of Draft	120 days	Fri 7/12/13	Fri 11/8/13
21	Navy RPM, BRAC PMO, and NOSSA Approval	0 days	Sat 5/2/15	Sat 5/2/15
22	**Site Permits**	**19 days**	**Mon 5/11/15**	**Fri 5/29/15**
23	Submission and Review of Permits	14 days	Mon 5/11/15	Fri 5/29/15
24	Approval of Permits	0 days	Fri 5/29/15	Fri 5/29/15
25	**Field Work**	**112 days**	**Fri 5/29/15**	**Thu 9/17/15**
26	Pre-Mobilization Kick-Off Meeting	1 day	Fri 5/29/15	Fri 5/29/15
27	Construction NTP / Start	0 days	Fri 5/29/15	Fri 5/29/15
28	Site Management (Calendar Days)	108 days	Tue 6/2/15	Thu 9/17/15
29	Site Management (Working Days)	77 days	Mon 6/1/15	Thu 9/17/15
30	**Mobilization**	**5 days**	**Mon 6/1/15**	**Fri 6/5/15**
31	Mobilization	2 days	Mon 6/1/15	Tue 6/2/15
32	Site Preparation	5 days	Mon 6/1/15	Fri 6/5/15
33	**Remediation**	**85 days**	**Mon 6/8/15**	**Mon 8/31/15**
34	Soil Removal	35 days	Mon 6/8/15	Mon 7/27/15
35	Soil Stabilization	45 days	Mon 6/15/15	Mon 8/17/15
36	Soil Disposal	45 days	Mon 6/29/15	Mon 8/31/15
37	**Survey**	**1 day**	**Wed 6/3/15**	**Wed 6/3/15**
38	Site Survey	1 day	Wed 6/3/15	Wed 6/3/15
39	**Site Cleanup/Demobilization**	**17 days**	**Tue 9/1/15**	**Thu 9/17/15**
40	Site Restoration	10 days	Tue 9/1/15	Tue 9/15/15
41	Demobilitation	2 days	Wed 9/16/15	Thu 9/17/15
42	Construction Finish	0 days	Thu 9/17/15	Thu 9/17/15
43	**Completion Report**	**174 days**	**Fri 9/18/15**	**Wed 3/9/16**
44	Prepare Draft	25 days	Fri 9/18/15	Thu 10/22/15
45	Submit Draft	0 days	Thu 10/22/15	Thu 10/22/15
46	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Draft	35 days	Fri 10/23/15	Thu 11/26/15
47	Address Comments and Prepare Draft Final	15 days	Mon 11/30/15	Fri 12/18/15
48	Submit Draft Final	0 days	Fri 12/18/15	Fri 12/18/15
49	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Draft Final	30 days	Sat 12/19/15	Sun 1/17/16
50	Navy RPM, BRAC PMO, USEPA, and PREQB Approval	0 days	Wed 3/9/16	Wed 3/9/16
51	Address Comments and Prepare Final	15 days	Tue 1/19/16	Mon 2/8/16
52	Submit Final	0 days	Mon 2/8/16	Mon 2/8/16
53	Navy RPM, BRAC PMO, USEPA, and PREQB Review of Final	30 days	Tue 2/9/16	Wed 3/9/16



Project: UXO 1 (SWMU 77) Soil Remo
Date: Tue 5/19/15

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Page 1

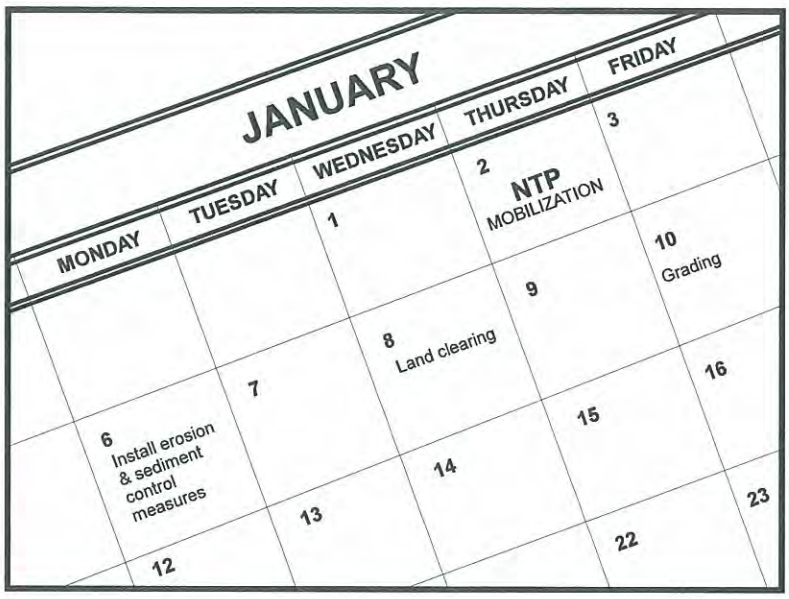
APPENDIX F. CONSTRUCTION ACTIVITIES, MATERIALS USED, AND ASSOCIATED POLLUTANTS

Appendix F - Construction Activities, Materials Used and Associated Pollutants

Construction Activity	Map Designation	Sediment	Nutrients	Lead	Oil, Grease, Fuels	Other Toxic Chemicals	Miscellaneous Waste
Material Management							
Material Delivery and Storage	Support Zone (TBD)	X	X	X	X	X	
Material Use	NS-8 NS-9		X	X	X	X	
Waste Management							
Vehicle use, storage, emergency maintenance and fueling	NS-9, NS-10				X	X	X
Equipment use, storage, and maintenance	NS-10				X	X	X
Excavation Activities (contaminated soils)	Phase VIIA, Phase VIIB, and potentially hazardous locations (SE-3)	X	X	X	X	X	X
Decontamination Activities	NS-8, TC-3	X	X	X	X	X	X
Dust Suppression	NS-1	X	X	X	X	X	X
Sanitary/Septic Waste	Support Zone (TBD)						X

APPENDIX G. CASQA BMP HANDBOOK FACT SHEETS

Scheduling EC-1



Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase

of construction. Clearly show how the rainy season relates to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs
  - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
  - Sequence trenching activities so that most open portions are closed before new trenching begins.
  - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

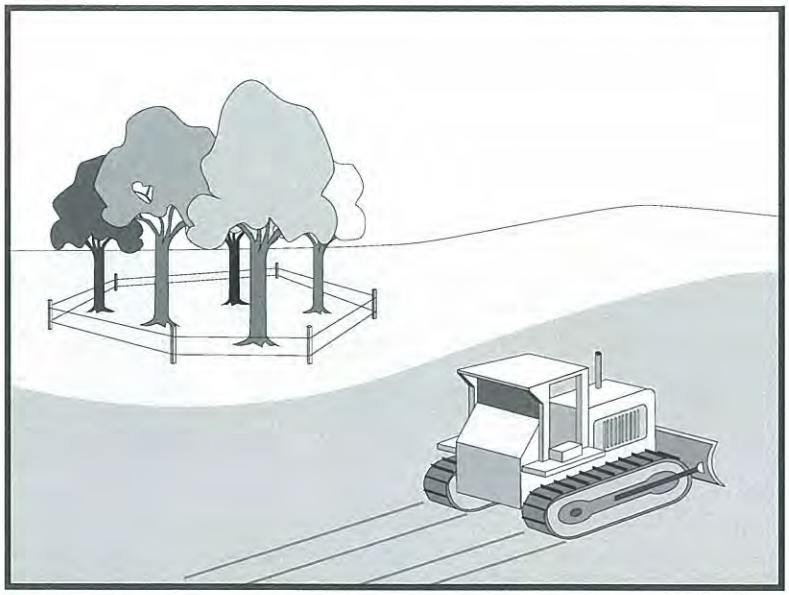
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation Of Existing Vegetation EC-2



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

Limitations

- Requires forward planning by the owner/developer,

contractor, and design staff.

- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
  - Orange colored plastic mesh fencing works well.
  - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of $10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization
  - Fertilize stressed or damaged broadleaf trees to aid recovery.
  - Fertilize trees in the late fall or early spring.

- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.

- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

References

County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Hydroseeding EC-4

Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

EC-14 Compost Blanket

EC-16 Non-Vegetative Stabilization

Description and Purpose

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, fertilizer, and stabilizing emulsion with a hydraulic mulcher, to temporarily protect exposed soils from erosion by water and wind. Hydraulic seeding, or hydroseeding, is simply the method by which temporary or permanent seed is applied to the soil surface.

Suitable Applications

Hydroseeding is suitable for disturbed areas requiring temporary protection until permanent stabilization is established, for disturbed areas that will be re-disturbed following an extended period of inactivity, or to apply permanent stabilization measures. Hydroseeding without mulch or other cover (e.g. EC-7, Erosion Control Blanket) is not a stand-alone erosion control BMP and should be combined with additional measures until vegetation establishment.

Typical applications for hydroseeding include:

- Disturbed soil/graded areas where permanent stabilization or continued earthwork is not anticipated prior to seed germination.
- Cleared and graded areas exposed to seasonal rains or temporary irrigation.
- Areas not subject to heavy wear by construction equipment or high traffic.

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Limitations

- Availability of hydroseeding equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Hydraulic seed should be applied with hydraulic mulch or a stand-alone hydroseed application should be followed by one of the following:
  - Straw mulch (see Straw Mulch EC-6)
  - Rolled erosion control products (see Geotextiles and Mats EC-7)
  - Application of Compost Blanket (see Compost Blanket EC-14)

  Hydraulic seed may be used alone only on small flat surfaces when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control.
- Hydraulic seed without mulch does not provide immediate erosion control.
- Temporary seeding may not be appropriate for steep slopes (i.e., slopes readily prone to rill erosion or without sufficient topsoil).
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation may not be appropriate for short term inactivity (i.e. less than 3-6 months).

Implementation

In order to select appropriate hydraulic seed mixtures, an evaluation of site conditions should be performed with respect to:

- Soil conditions
- Site topography and exposure (sun/wind)
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps should be followed for implementation:

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying (See EC-15, Soil Preparation) the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.

- Avoid use of hydraulic seed in areas where the BMP would be incompatible with future earthwork activities.
- Hydraulic seed can be applied using a multiple step or one step process.
  - In a multiple step process, hydraulic seed is applied first, followed by mulch or a Rolled Erosion Control Product (RECP).
  - In the one step process, hydraulic seed is applied with hydraulic mulch in a hydraulic matrix. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- All hydraulically seeded areas should have mulch, or alternate erosion control cover to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds should be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag should be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container should be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed should be pellet inoculated. Inoculant sources should be species specific and should be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer should conform to the requirements of the California Food and Agricultural Code, which can be found at http://www.leginfo.ca.gov/.html/fac_table_of_contents.html. Fertilizer should be pelleted or granular form.
- Follow up applications should be made as needed to cover areas of poor coverage or germination/vegetation establishment and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Costs

Average cost for installation and maintenance may vary from as low as $1,900 per acre for flat slopes and stable soils, to $4,000 per acre for moderate to steep slopes and/or erosive soils. Cost of seed mixtures vary based on types of required vegetation.

BMP	Installed Cost per Acre
Hydraulic Seed	$1,900-$4,000

Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

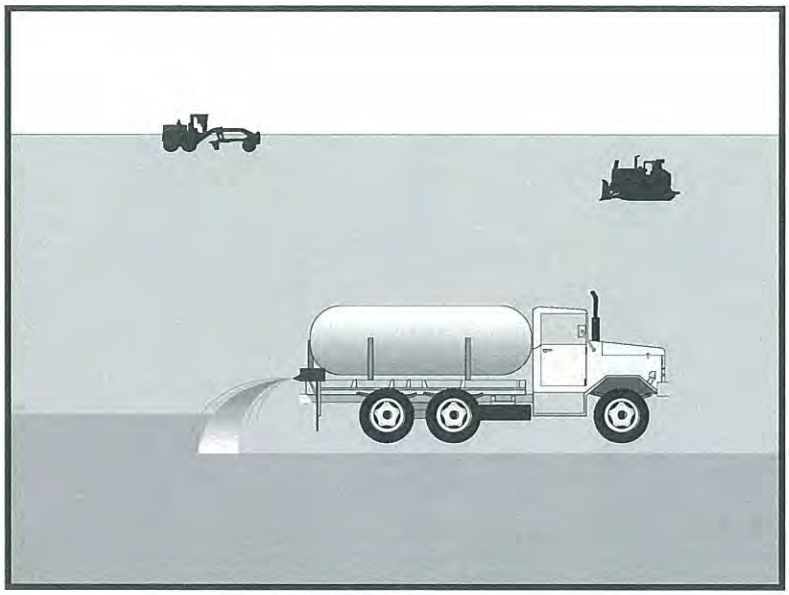
References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Soil Binders EC-5



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time
- Soil stockpiles
- Temporary haul roads prior to placement of crushed rock
- Compacted soil road base
- Construction staging, materials storage, and layout areas

Limitations

- Soil binders are temporary in nature and may need reapplication.

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- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.
- Soil binders may not sufficiently penetrate compacted soils.
- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of some chemical soil binders are relatively unknown and some may have water quality impacts due to their chemical makeup.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.
- Site soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Material Safety Data Sheet (MSDS) from the manufacturer to ensure non-toxicity.
- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.
  - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.
  - Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.

- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application is related to the functional longevity of the binder, which can be affected by subgrade conditions, surface type, climate, and maintenance schedule.
- Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material-Based (Short Lived, <6 months) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together, but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material-Based (Long Lived, 6-12 months) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1 part emulsion
- For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with the manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

Poly-Acrylamide (PAM) and Copolymer of Acrylamide: Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

- Limitations specific to PAM are as follows:

- Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
- The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.
- PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".
- PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.

- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd^2 or according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 6 to 12 in.
  - Allow treated area to cure for the time recommended by the manufacturer; typically at least 24 hours.
  - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
  - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd^2.

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre (2000)[1]	Estimated Cost per Acre (2009)[2]
Plant-Material-Based (Short Lived) Binders	$700-$900	$770-$990
Plant-Material-Based (Long Lived) Binders	$1,200-$1,500	$1,320-$1,650
Polymeric Emulsion Blend Binders	$700 -$1,500	$770-$1,650
Cementitious-Based Binders	$800-$1,200	$880-$1,350

1. Source: Erosion Control Pilot Study Report, Caltrans, June 2000.
2. 2009 costs reflect a 10% escalation over year 2000 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

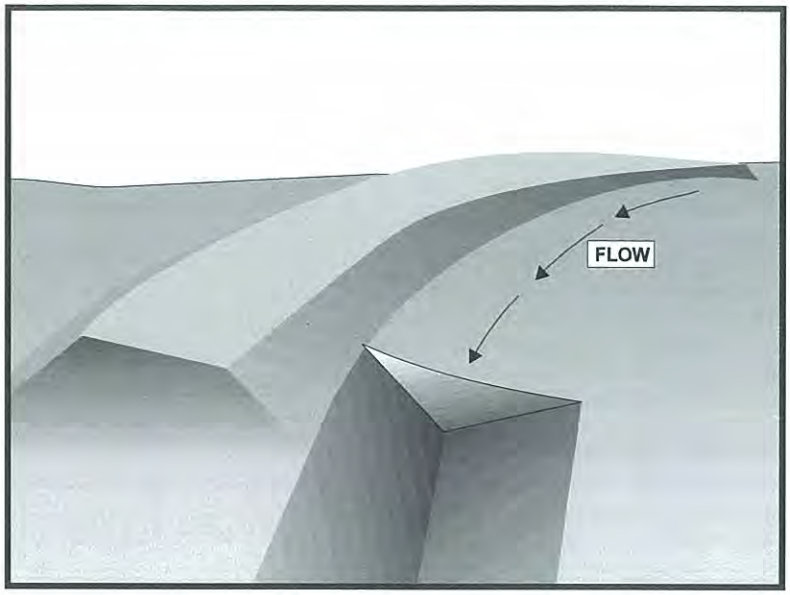
Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Earth Dikes and Drainage Swales EC-9



Categories

EC	Erosion Control	☑
SE	Sediment Control	
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WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
  - To convey surface runoff down sloping land
  - To intercept and divert runoff to avoid sheet flow over sloped surfaces
  - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
  - To intercept runoff from paved surfaces
  - Below steep grades where runoff begins to concentrate
  - Along roadways and facility improvements subject to flood drainage

- At the top of slopes to divert runon from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations, and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert

runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin

(SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.

- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 percent, but not more than 15 percent.
- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.

- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 percent, and use rip-rap or sod for swales with a slope between 5 and 15 percent. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from $15 to $55 per ft for both earthwork and stabilization and depends on availability of material, site location, and access.
- Small dikes: $2.50 - $6.50/linear ft; Large dikes: $2.50/yd^3.
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

References

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursetynsky, P.E., McGraw Hill Book Company, 1986.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: http://anrcatalog.ucdavis.edu/pdf/8125.pdf

National Association of Home Builders (NAHB). Stormwater Runoff & Nonpoint Source Pollution Control Guide for Builders and Developers. National Association of Home Builders, Washington, D.C., 1995

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991

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Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

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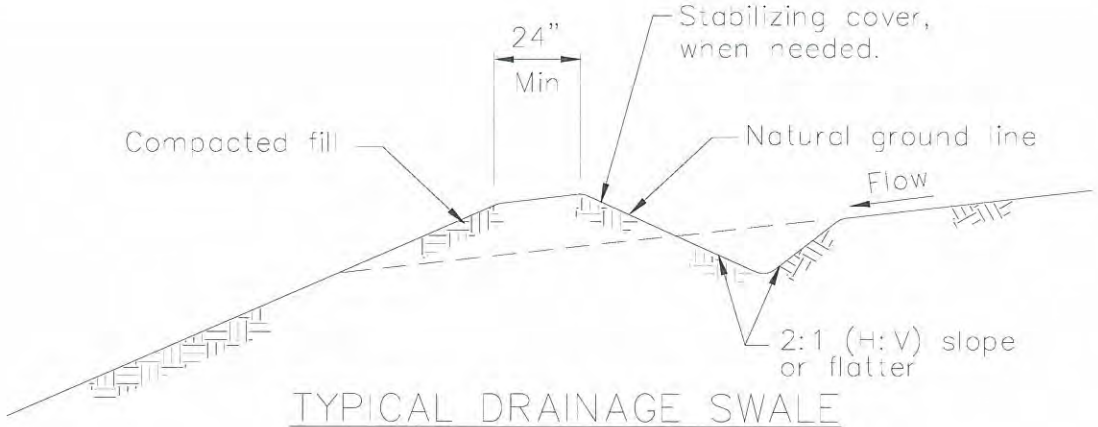
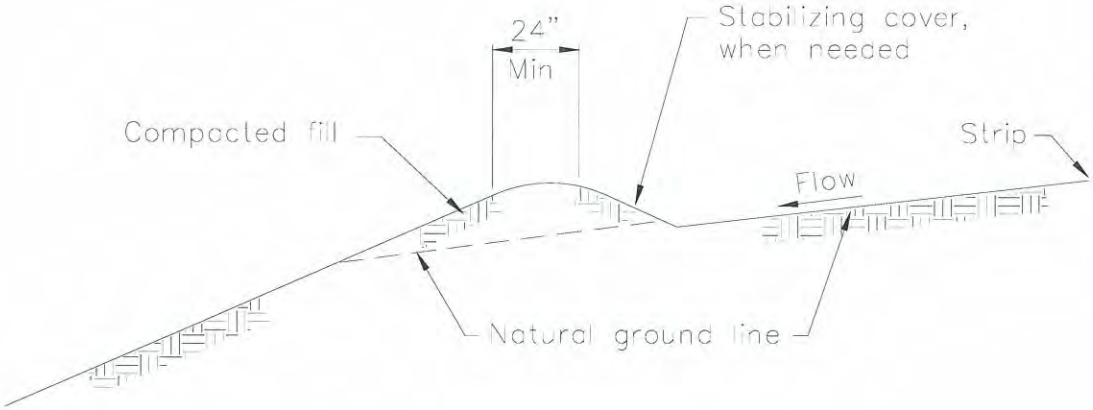


TYPICAL DRAINAGE SWALE
NOT TO SCALE

NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE
NOT TO SCALE

Soil Preparation/Roughening EC-15

Description and Purpose

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This can include soil testing (for seed base, soil characteristics, or nutrients), as well as roughening surface soils by mechanical methods (including sheepsfoot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soil for additional BMPs, or to break up sheet flow. Soil Preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments, to enhance vegetative establishment.

Suitable Applications

Soil preparation: Soil preparation is essential to proper vegetative establishment. In particular, soil preparation (i.e. tilling, raking, and amendment) is suitable for use in combination with any soil stabilization method, including RECPs or sod. Soil preparation should not be confused with roughening.

Roughening: Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces. Soil preparation is most effective when used in combination with erosion controls. Soil Roughening is suitable for use as a complementary process for controlling erosion on a site. Roughening is not intended to be used as a stand-alone BMP, and should be used with perimeter controls, additional erosion control measures, grade breaks, and vegetative establishment for maximum effectiveness. Roughening is intended to only affect surface soils and should not compromise slope stability or overall compaction. Suitable applications for soil roughening include:

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-7 Geotextiles and Mats

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- Along any disturbed slopes, including temporary stockpiles, sediment basins, or compacted soil diversion berms and swales.
- Roughening should be used in combination with hydraulically applied stabilization methods, compost blanket, or straw mulch; but should not be used in combination with RECPs or sod because roughening is intended to leave terraces on the slope.

Limitations

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on the faces of slopes.
- In such cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation - such as hydraulic mulching and seeding applications - should be employed.
- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening, i.e., RECPs (erosion control blankets) should not be used with soil roughening due to a "bridging" effect, which suspends the blanket above the seed bed.
- Surface roughness has an effect on the amount of mulch material that needs to be applied, which shows up as a general increase in mulch material due to an increase in surface area (Topographic Index -see EC-3 Hydraulic Mulching).

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

General

A roughened surface can significantly reduce erosion. Based on tests done at the San Diego State Erosion Research Laboratory, various roughening techniques on slopes can result in a 12 - 76% reduction in the erosion rate versus smooth slopes.

Materials

Minimal materials are required unless amendments and/or seed are added to the soil. The majority of soil roughening/preparation can be done with equipment that is on hand at a normal construction site, such as bull dozers and compaction equipment.

Installation Guidelines

Soil Preparation

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.
- Based upon soil testing conducted, apply additional soil amendments (e.g. fertilizers, additional seed) to the soil to help with germination. Follow EC-4, Hydroseeding, when selecting and applying seed and fertilizers.

Cut Slope Roughening:

- Stair-step grade or groove the cut slopes that are steeper than 3:1.
- Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.
- Do not make individual vertical cuts more than 2 feet (0.6 m) high in soft materials or more than 3 feet (0.9 m) high in rocky materials.
- Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

- Place on fill slopes with a gradient steeper than 3:1 in lifts not to exceed 8 inches (0.2 m), and make sure each lift is properly compacted.
- Ensure that the face of the slope consists of loose, uncompacted fill 4-6 inches (0.1-0.2 m) deep.
- Use grooving or tracking to roughen the face of the slopes, if necessary.
- Do not blade or scrape the final slope face.

Roughening for Slopes to be Mowed:

- Slopes which require mowing activities should not be steeper than 3:1.
- Roughen these areas to shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.
- Make grooves close together (less than 10 inches), and not less than 1 inch deep, and perpendicular to the direction of runoff (i.e., parallel to the slope contours).
- Excessive roughness is undesirable where mowing is planned.

Roughening With Tracked Machinery:

- Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.
- Seed and mulch roughened areas as soon as possible to obtain optimum seed germination and growth.

Costs

Costs are based on the additional labor of tracking or preparation of the slope plus the cost of any required soil amendment materials.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check the seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.
- Inspect BMPs weekly during normal operations, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

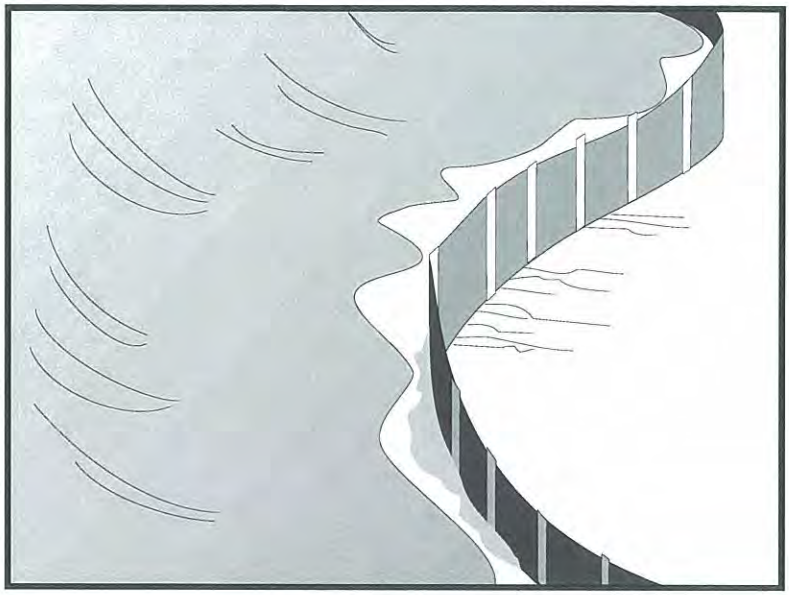
References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Silt Fence

SE-1



Categories

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Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-10 Storm Drain Inlet Protection

SE-14 Biofilter Bags

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard. Runoff typically ponds temporarily on the upstream side of silt fence.
- Do not use silt fence to divert water flows or place across any contour line. Fences not constructed on a level contour, or fences used to divert flow will concentrate flows resulting in additional erosion and possibly overtopping or failure of the silt fence.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.
- The maximum slope perpendicular to the fence line should be 1:1.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.

- Silt fences should remain in place until the disturbed area is permanently stabilized, after which, the silt fence should be removed and properly disposed.
- Silt fence should be used in combination with erosion source controls up slope in order to provide the most effective sediment control.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Woven geotextile material should contain ultraviolet 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.

- Layout in accordance with attached figures.
- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the slope of area draining to the silt fence is 4:1 (H:V) or less.
- Used for shorter durations, typically 5 months or less
- Area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Use is generally limited to 8 months or less.
- Area draining to fence produces moderate sediment loads.
- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
  - Fence fabric has higher tensile strength.
  - Fabric is reinforced with wire backing or additional support.
  - Posts are spaced closer than pre-manufactured, standard silt fence products.
  - Posts are metal (steel or aluminum)

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The

reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491.

- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts or bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement for health and safety purposes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench.

- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.

- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with native material and compacted.

- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where, due to specific site conditions, a 3 ft setback is not available, the silt fence may be constructed at the

toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and more difficult to maintain.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of $^1/_3$ and a maximum of ½ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the gerotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
    - Ease of installation (most often done with a 2 person crew). In addition, installation using static slicing has been found to be more efficient on slopes, in rocky soils, and in saturated soils.
    - Minimal soil disturbance.
    - Greater level of compaction along fence, leading to higher performance (i.e. greater sediment retention).
    - Uniform installation.
    - Less susceptible to undercutting/undermining.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is $7 per linear foot based on vendor research. Range of cost is $3.50 - $9.10 per linear foot.
- In tests, the slicing method required 0.33 man hours per 100 linear feet, while the trenched based systems required as much as 1.01 man hours per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.

- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.
- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

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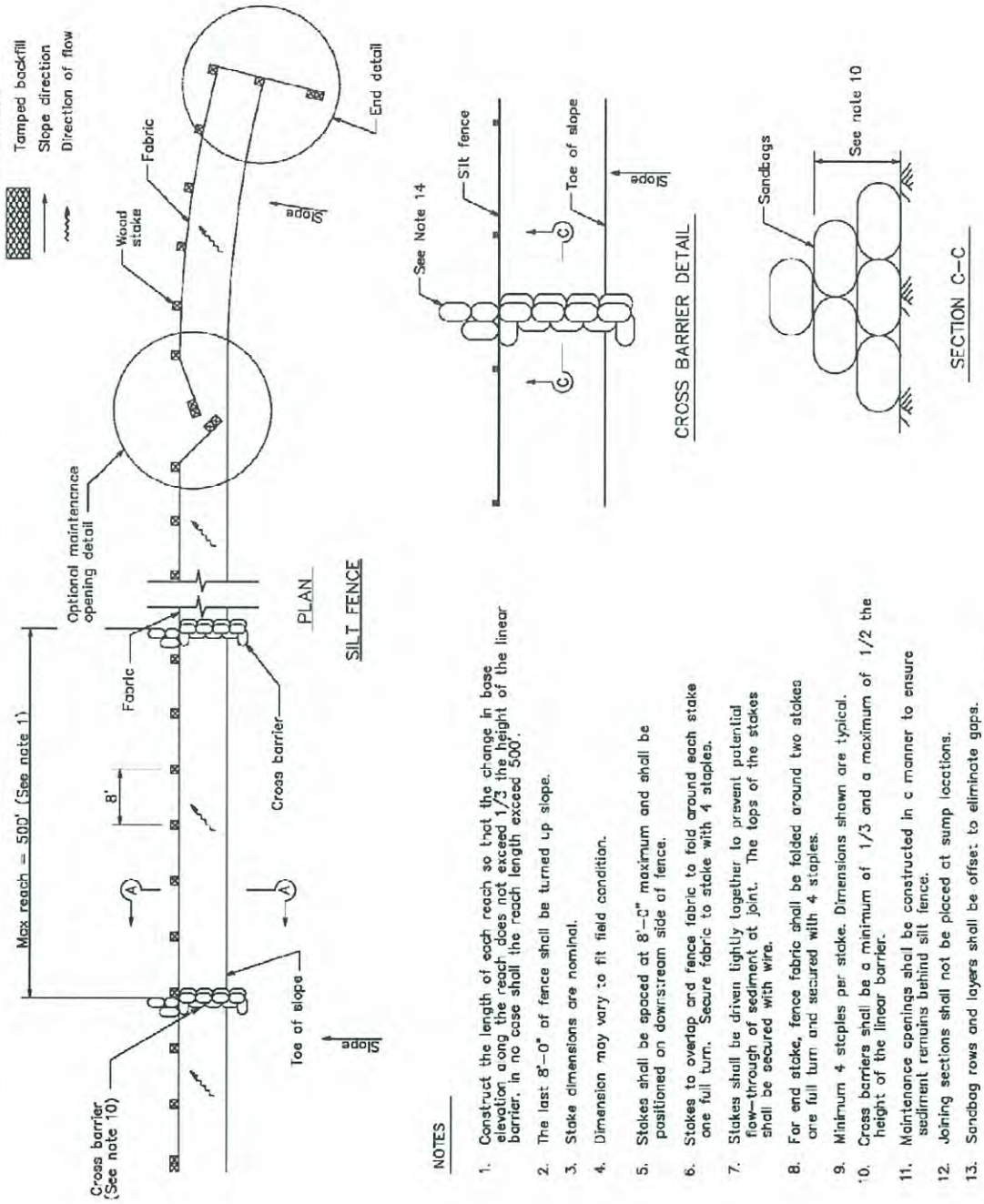
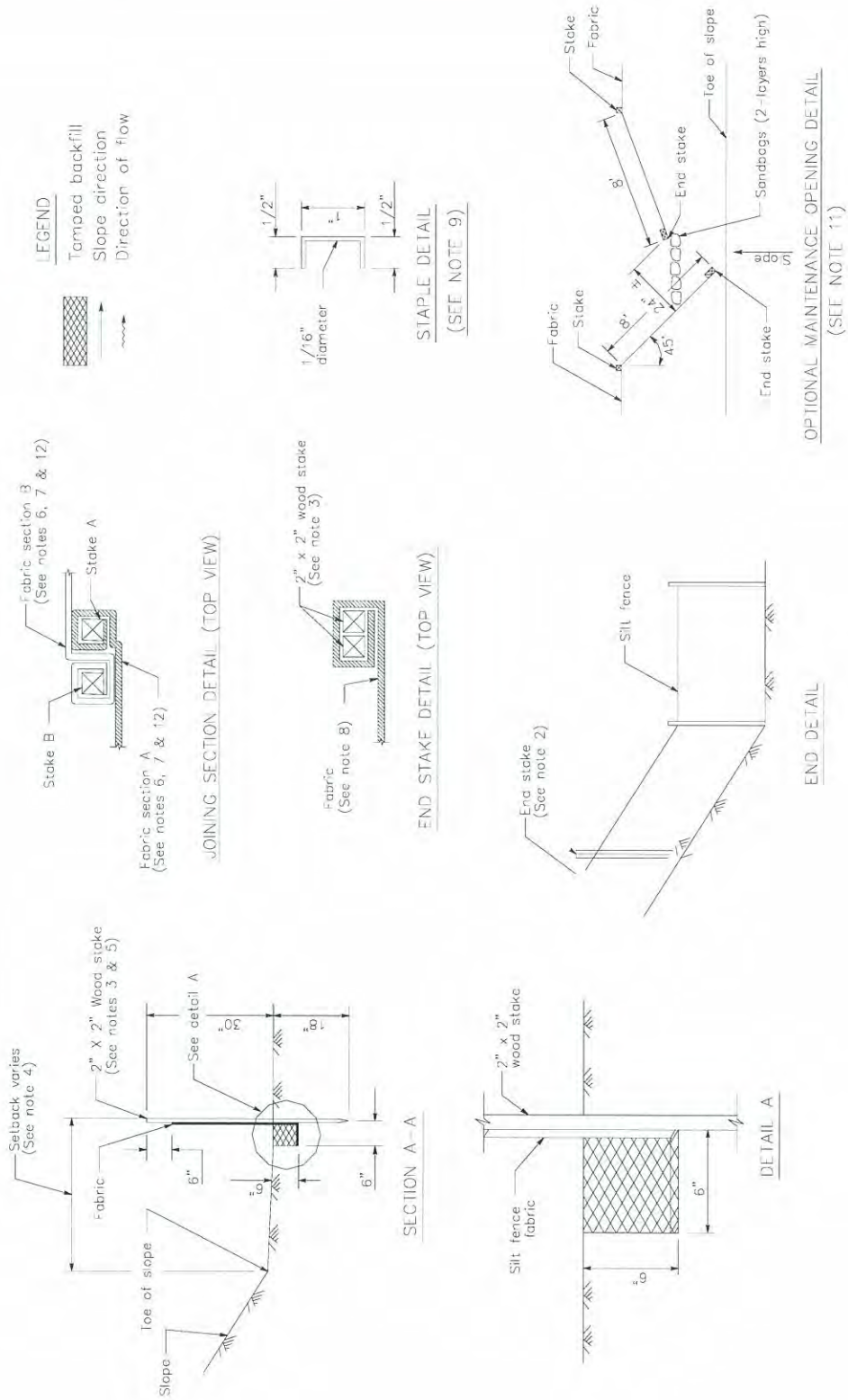
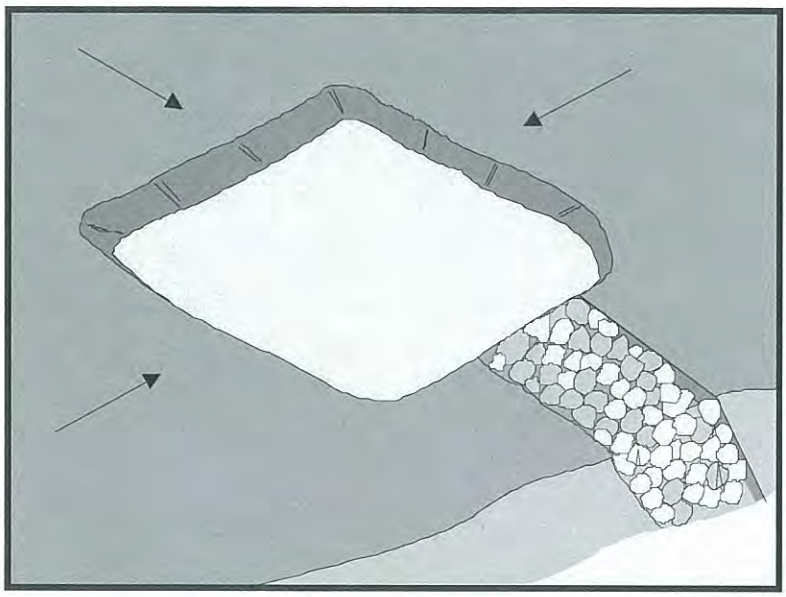


NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'–0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow–through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes are full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shal be constructed in c manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3–4 bags to cross barrier on downgradient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.


LEGEND
Tamped backfill
Slope direction
Direction of flow
1/2"
1/16" diameter
1/2"
STAPLE DETAIL
(SEE NOTE 9)
Stake
Fabric
Toe of slope
End stake
Sandbags (2-layers high)
8'
Fabric
Stake
8'
45°
End stake
Slope
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)
Fabric section B
(See notes 6, 7 & 12)
Stake A
Stake B
Fabric section A
(See notes 6, 7 & 12)
JOINING SECTION DETAIL (TOP VIEW)
2" x 2" wood stake
(See note 3)
Fabric
(See note 8)
END STAKE DETAIL (TOP VIEW)
Silt fence
End stake
(See note 2)
END DETAIL
Setback varies
(See note 4)
2" X 2" Wood stake
(See notes 3 & 5)
See detail A
30"
18"
Fabric
6"
6"
6"
Toe of slope
Slope
SECTION A-A
2" x 2"
wood stake
Silt fence
fabric
6"
6"
DETAIL A

Sediment Trap SE-3



Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

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Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed of, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criteria for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.
- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.

- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation and maintenance (18 month useful life) is $0.73 per ft^3 ($1,300 per drainage acre). Maintenance costs are approximately 20% of installation costs.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 72 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs shall be implemented at all times during dewatering activities.

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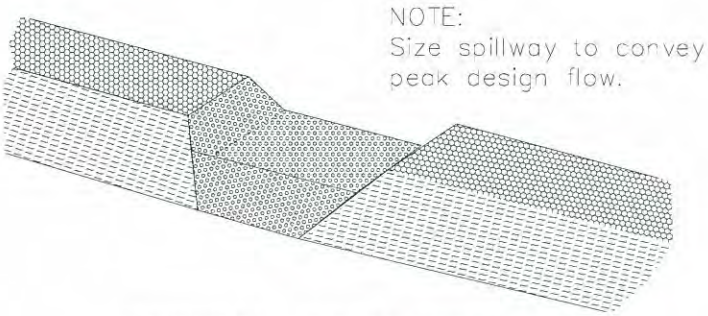
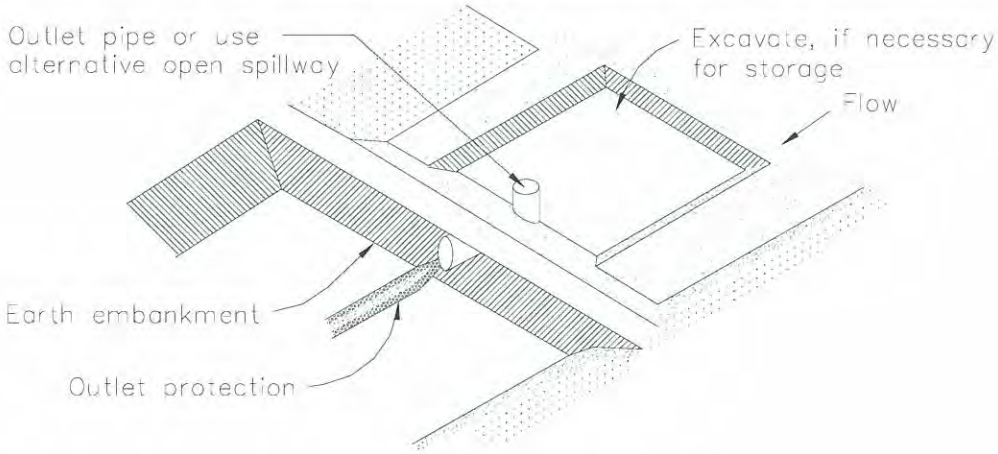
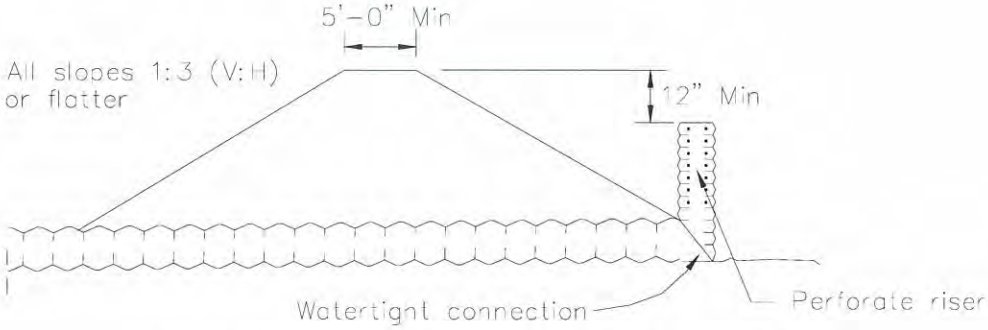


TYPICAL OPEN SPILLWAY

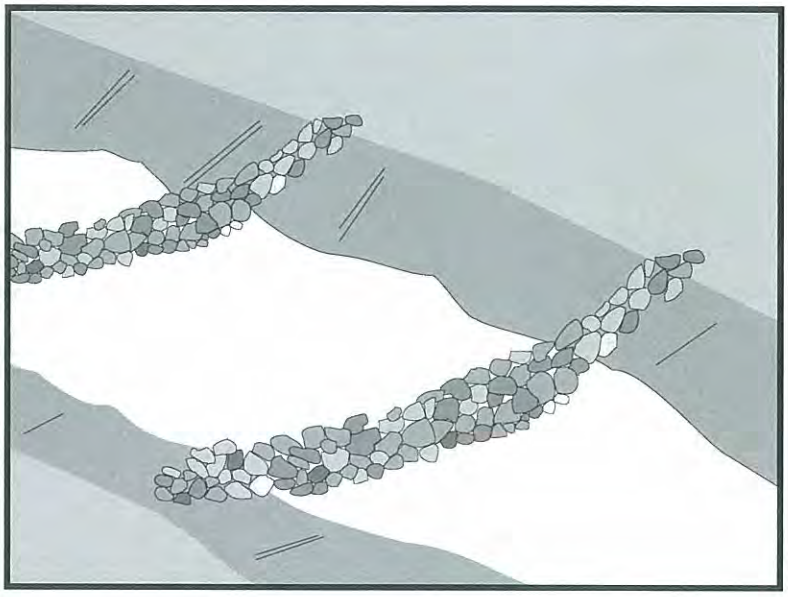




EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

Check Dams SE-4



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- To act as a grade control structure.

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Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a "permanent" ditch or swale being constructed early and used as a "temporary" conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don't use check dams. Consider alternative BMPs, or.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see "Spacing Between Check Dams" detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of

the ditch or swale (see "Typical Rock Check Dam" detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber, and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see "Gravel Bag Check Dam" detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer's instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.
- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.
- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.
- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.
- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.
- Upper rows or gravel and sand bags shall overlap joints in lower rows.
- Fiber rolls should be trenched in, backfilled, and firmly staked in place.
- Install along a level contour.
- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

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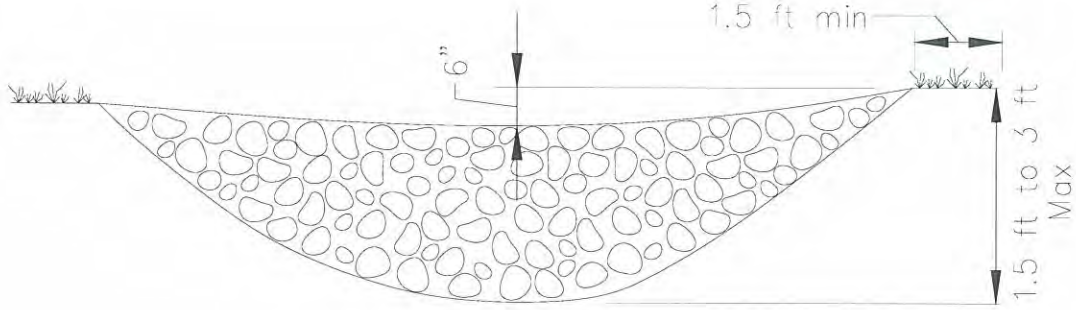
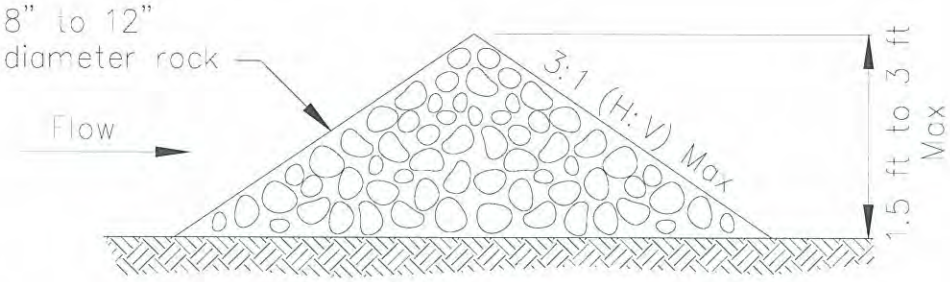
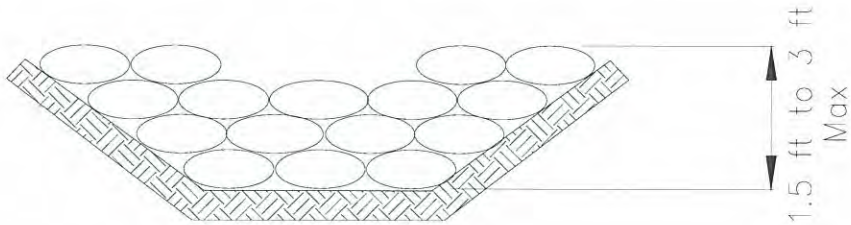


ELEVATION

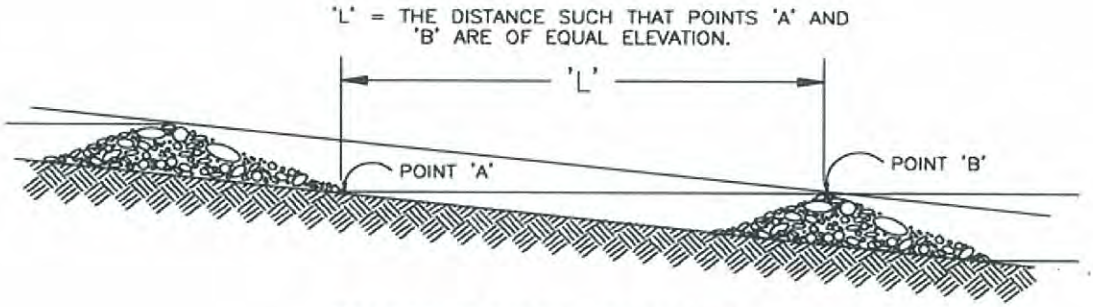


TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE

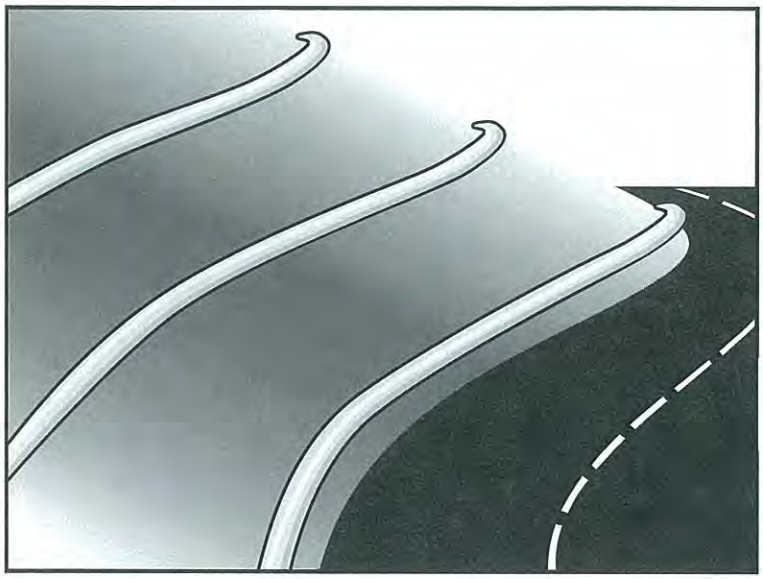


GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE



SPACING BETWEEN CHECK DAMS

Fiber Rolls SE-5



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
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WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Description and Purpose

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

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- Around temporary stockpiles.

Limitations

- Fiber rolls are not effective unless trenched in and staked.
- Not intended for use in high flow situations.
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months depending upon local conditions.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed free rice straw, flax, or a similar agricultural material bound into a tight tubular roll by netting.
- Typical fiber rolls vary in diameter from 9 in. to 20 in. Larger diameter rolls are available as well.

Installation

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be ¼ to 1/3 of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Typically, fiber rolls encased with plastic netting are used for a temporary application because the netting does not biodegrade. Fiber rolls used in a permanent application are typically encased with a biodegradeable material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for regular fiber rolls range from $20 - $30 per 25 ft roll.

Material costs for PAM impregnated fiber rolls range between 7.00-$9.00 per linear foot, based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed

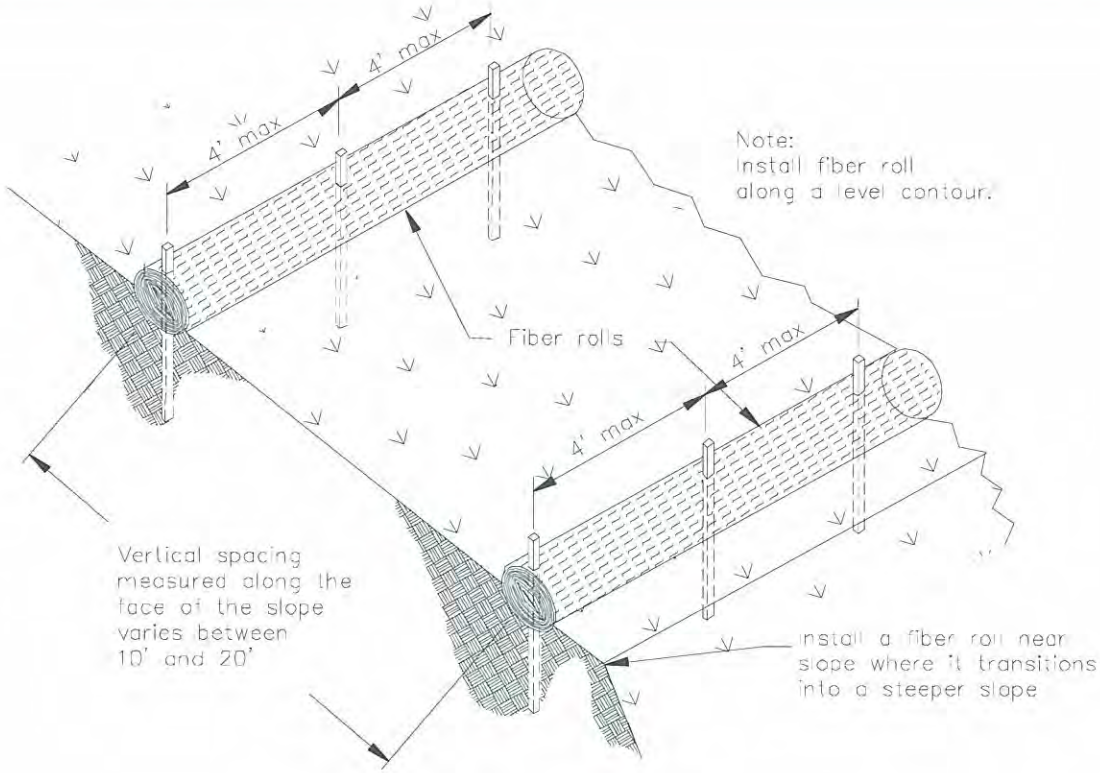
in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

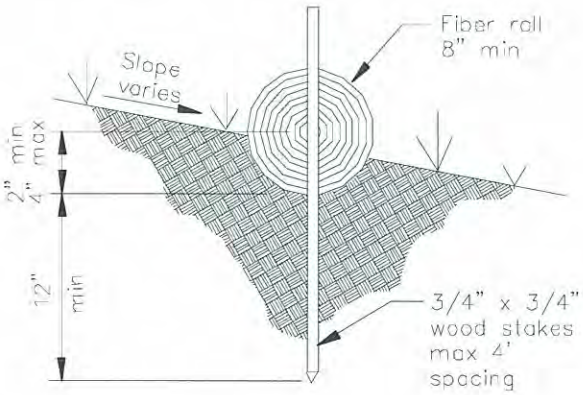
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

Street Sweeping and Vacuuming SE-7

Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.

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- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

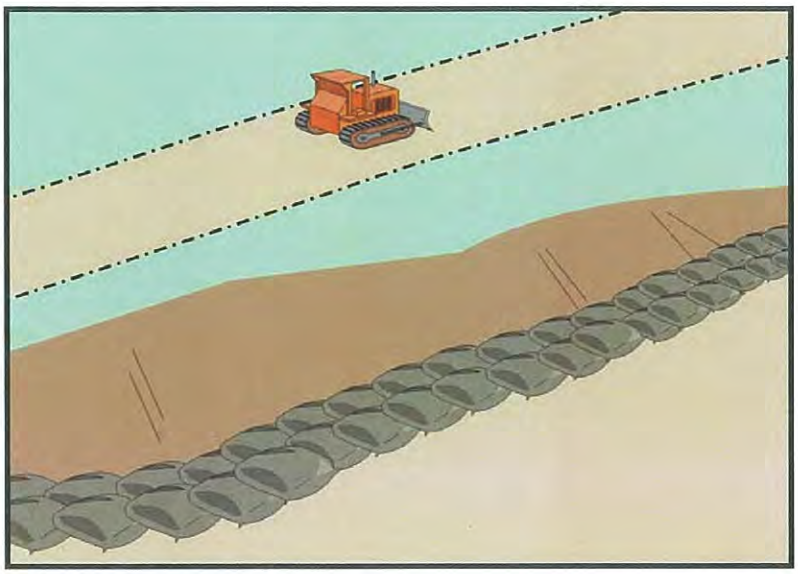
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

Sandbag Barrier SE-8



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-14 Biofilter Bags

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes.
  - As sediment traps at culvert/pipe outlets.
  - Below other small cleared areas.
  - Along the perimeter of a site.
  - Down slope of exposed soil areas.
  - Around temporary stockpiles and spoil areas.
  - Parallel to a roadway to keep sediment off paved areas.
  - Along streams and channels.
- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

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- At the top of slopes to divert runoff away from disturbed slopes.
- As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Sand is easily transported by runoff if bag is damaged or ruptured.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months. When used to detain concentrated flows, maintenance requirements increase.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

    Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Stack sandbags at least three bags high.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- ***Sandbag Material:*** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- ***Sandbag Size:*** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) permeable material free from clay and deleterious material, such as recycled concrete or asphalt..

Costs

Empty sandbags cost $0.25 - $0.75. Average cost of fill material is $8 per yd^3. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at $1.50 - $2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

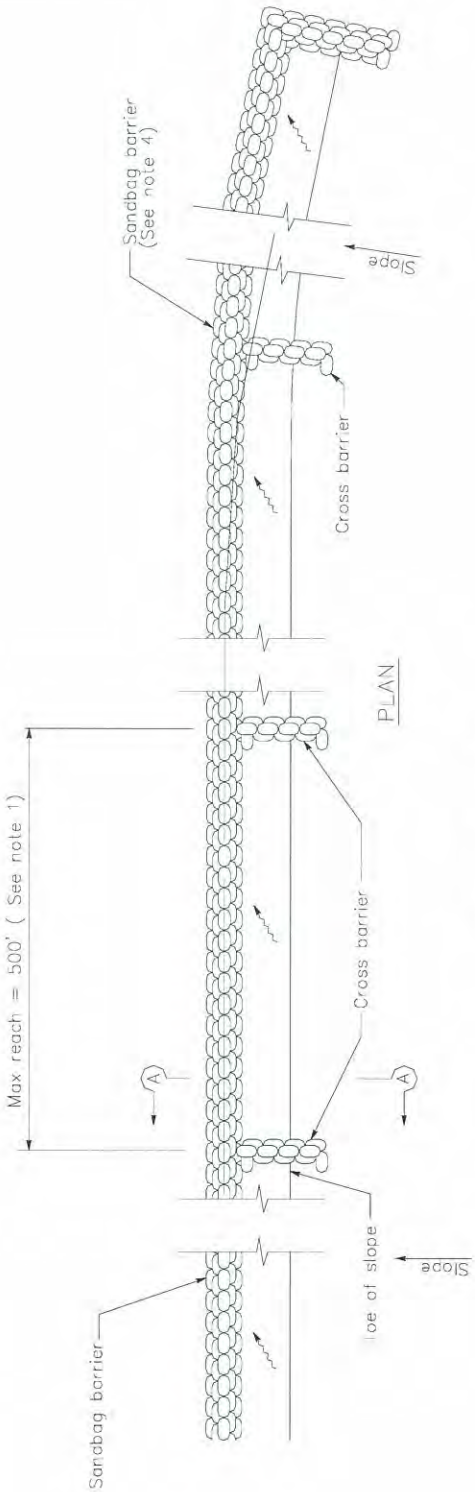
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

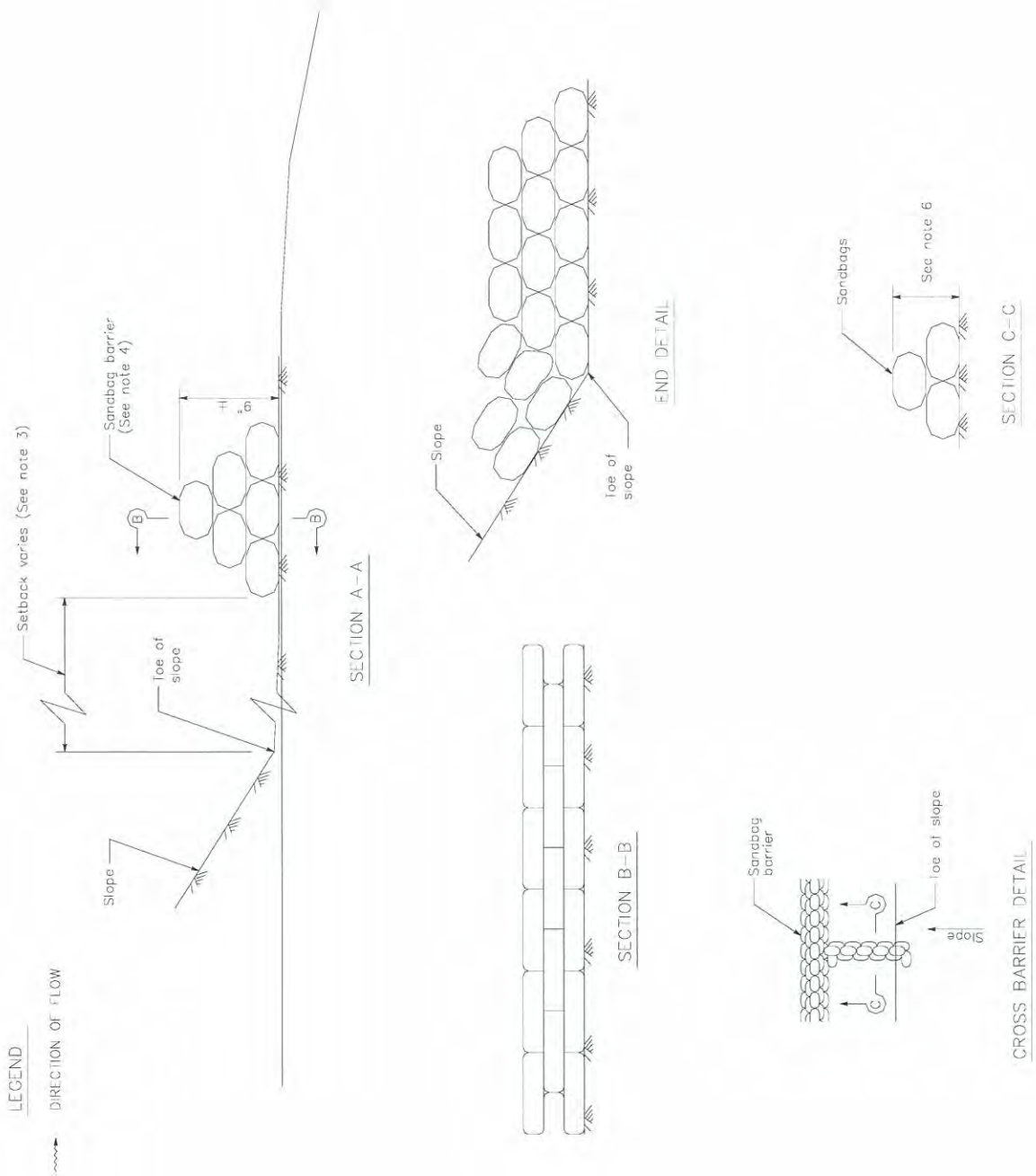
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



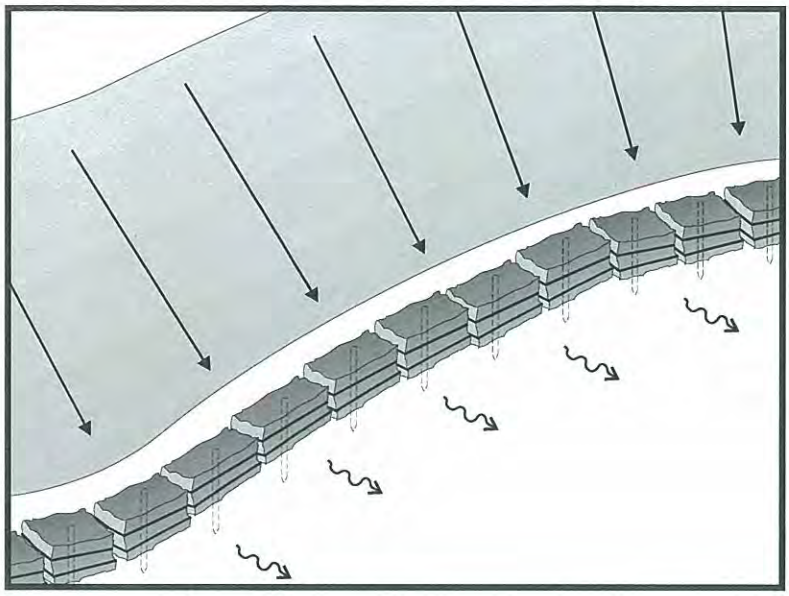
SANDBAG BARRIER

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags lightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.


LEGEND
DIRECTION OF FLOW
Setback varies (See note 3)
Sandbag barrier (See note 4)
Toe of slope
Slope
B
B
SECTION A-A
Slope
Toe of slope
END DETAIL
SECTION B-B
Sandbags
See note 6
SECTION C-C
Sandbag barrier
Toe of slope
Slope
C
C
CROSS BARRIER DETAIL

Straw Bale Barrier SE-9



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet- flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

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- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
  - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
  - Slopes greater than 10:1 (H:V): Not recommended.

- Turn the ends of the straw bale barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.
- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.
- Maximum flow path to the barrier should be limited to 100 ft.
- Straw bale barriers should consist of two parallel rows.
  - Butt ends of bales tightly
  - Stagger butt joints between front and back row
  - Each row of bales must be trenched in and firmly staked
- Straw bale barriers are limited in height to one bale laid on its side.
- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.
- See attached figure for installation details.

Materials

- ***Straw Bale Size:*** Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.
- ***Bale Bindings:*** Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.
- ***Stakes:*** Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost $5 - $7 each. Adequate labor should be budgeted for installation and maintenance.

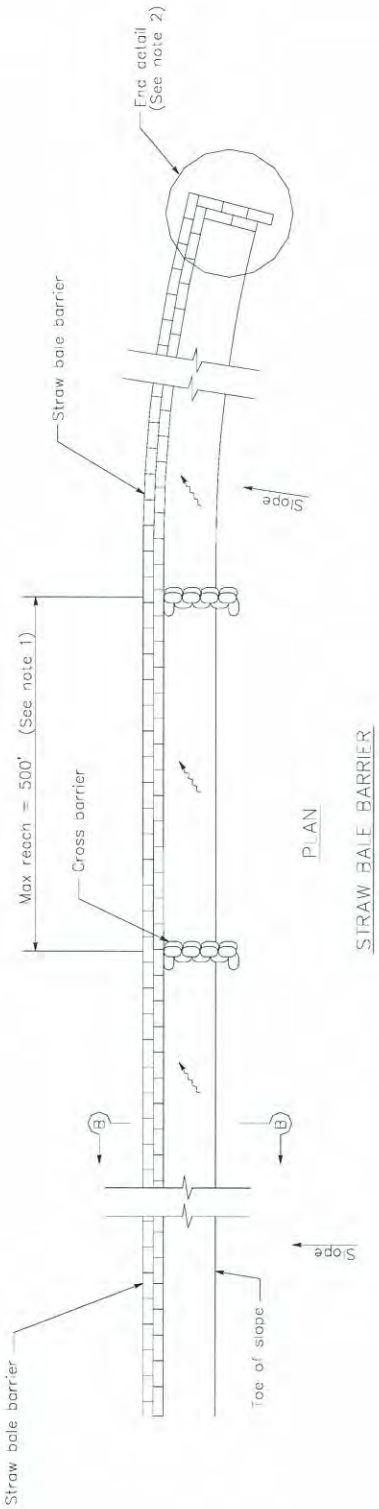
Inspection and Maintenance

Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.
- Replace or repair damaged bales as needed.
- Repair washouts or other damages as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



PLAN

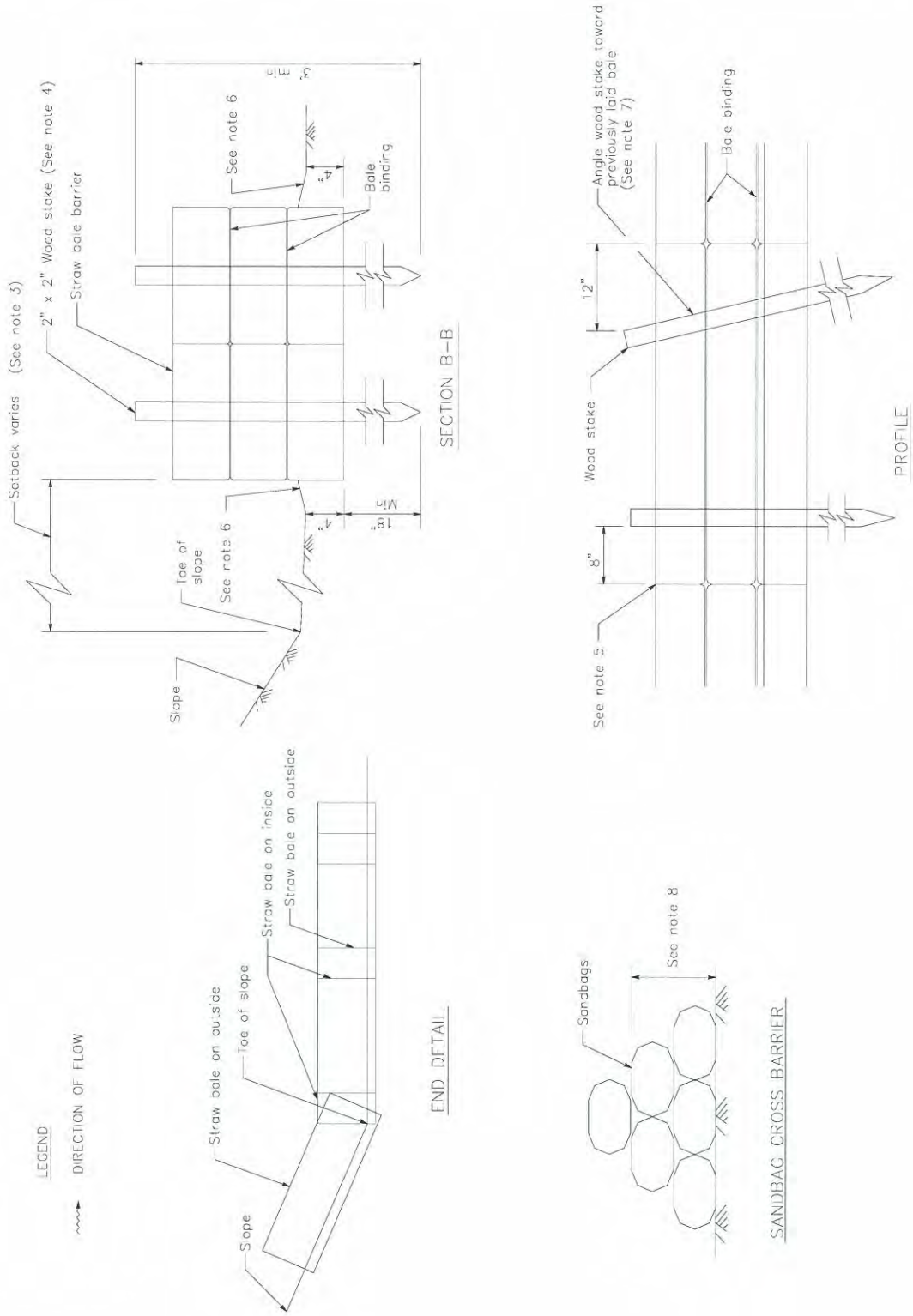
STRAW BALE BARRIER

LEGEND

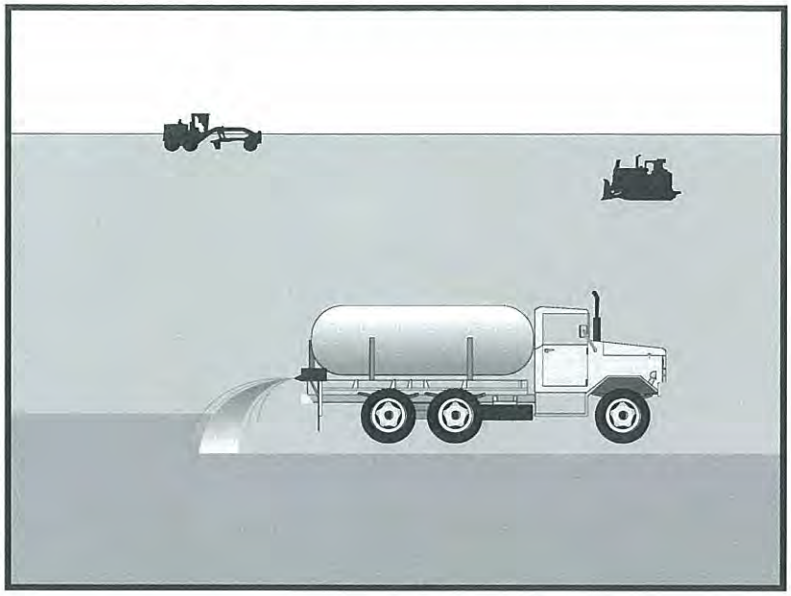
DIRECTION OF FLOW

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.


Setback varies (See note 3)
2" x 2" Wood stake (See note 4)
Straw bale barrier
See note 6
Bale binding
4"
Min. 18"
Toe of slope
See note 6
Slope
SECTION B-B
Angle wood stake toward previously laid bale (See note 7)
Bale binding
12"
Wood stake
8"
See note 5
PROFILE
LEGEND
DIRECTION OF FLOW
Straw bale on outside
Toe of slope
Straw bale on inside
Straw bale on outside
Slope
END DETAIL
Sandbags
See note 8
SANDBAG CROSS BARRIER

Wind Erosion Control WE-1



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

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- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/ Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

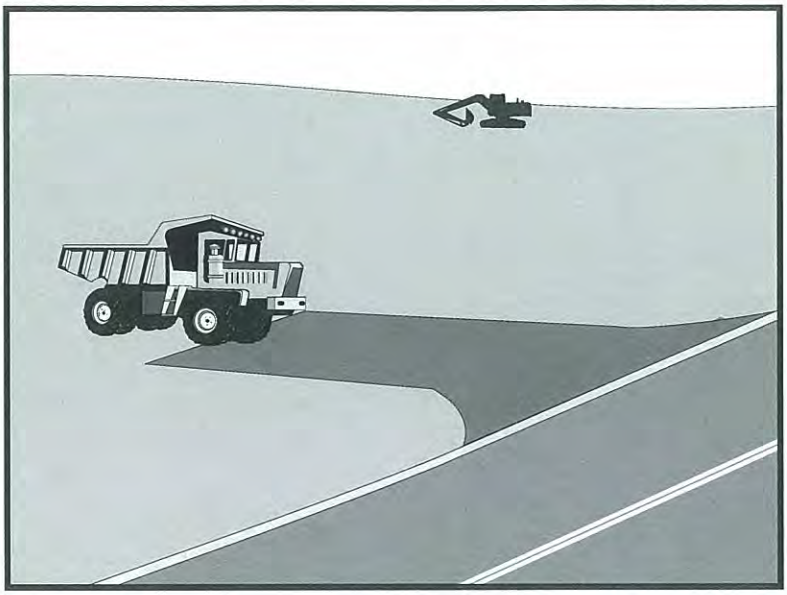
California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stabilized Construction Entrance/Exit TC-1



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water

runoff.

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

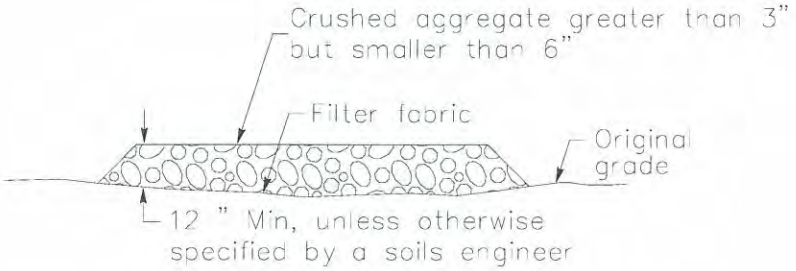
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



SECTION B–B
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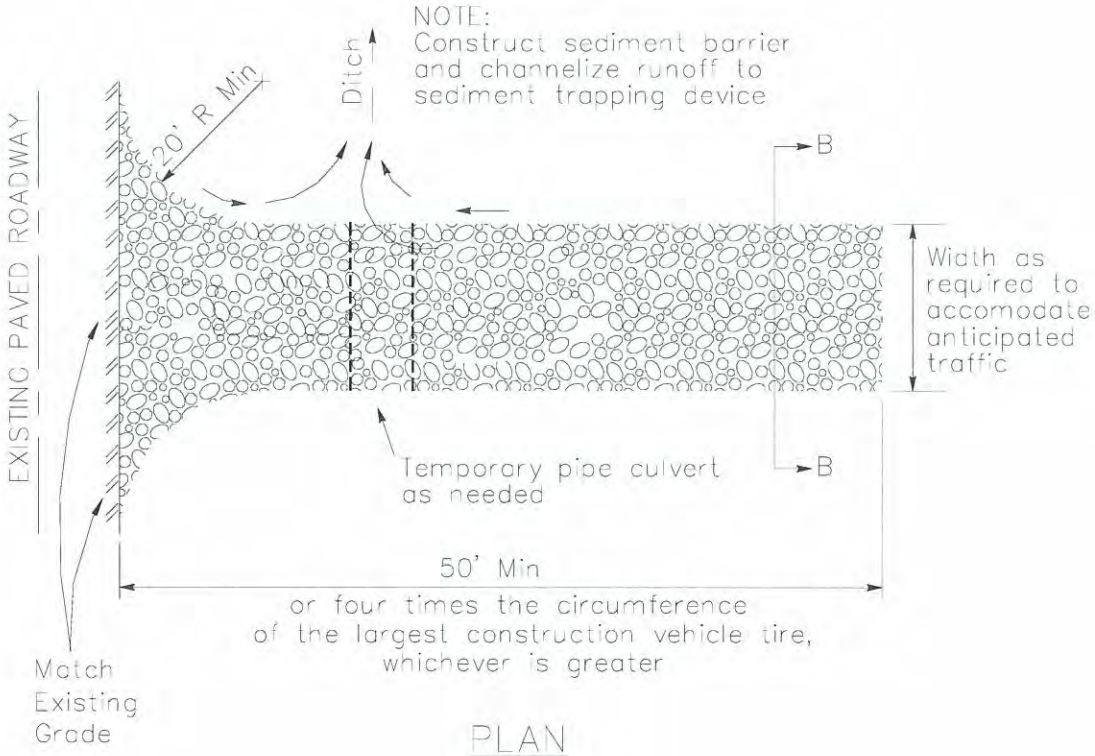
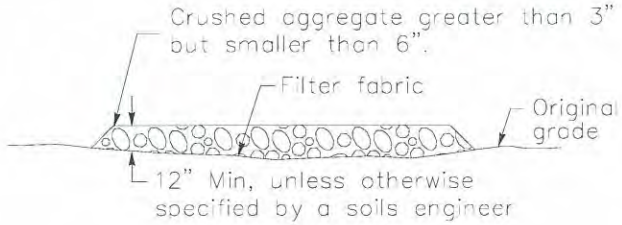


PLAN
NTS



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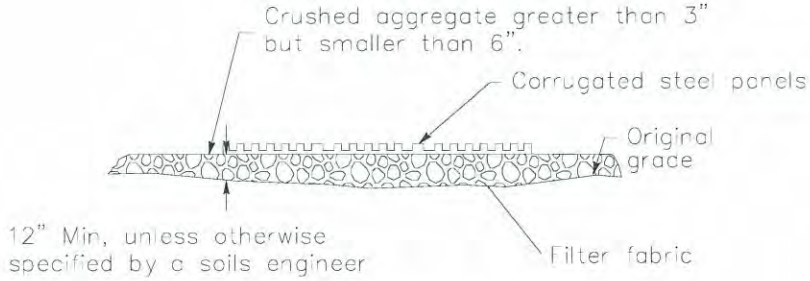
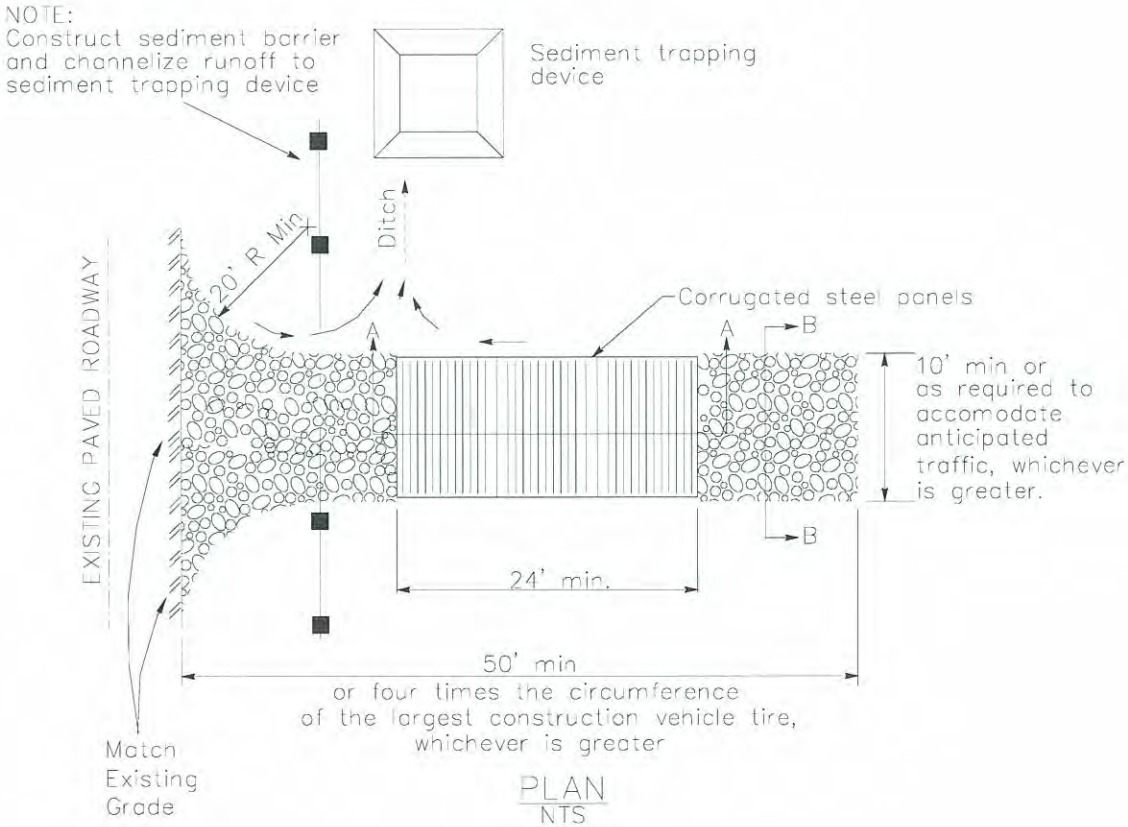
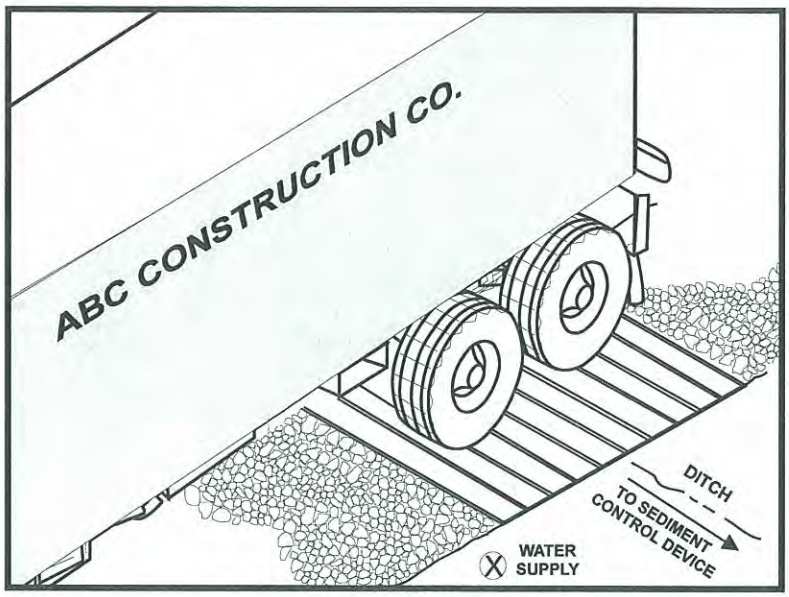


SECTION A-A
NOT TO SCALE



PLAN
NTS

Entrance/Outlet Tire Wash TC-3



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit

Description and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

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- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.
- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.
- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

References

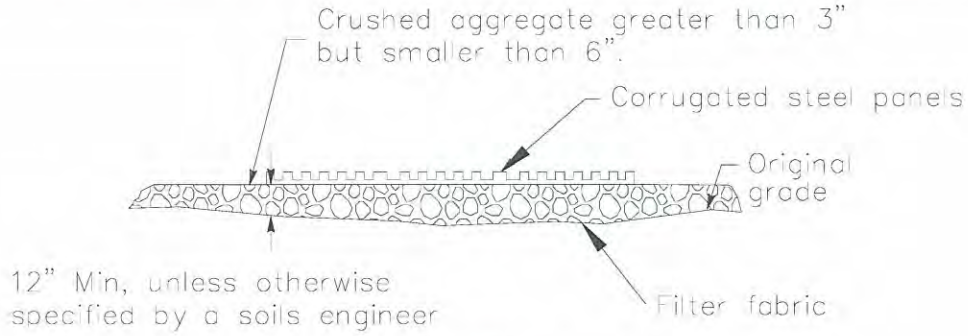
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



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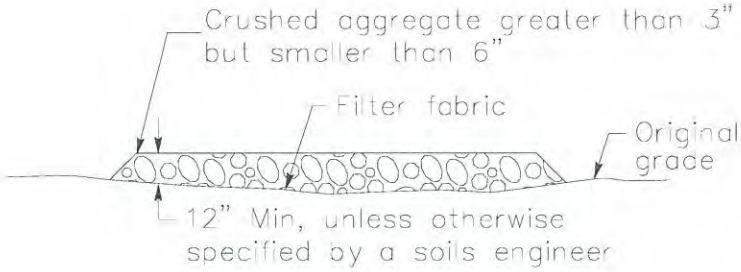

SECTION B–B
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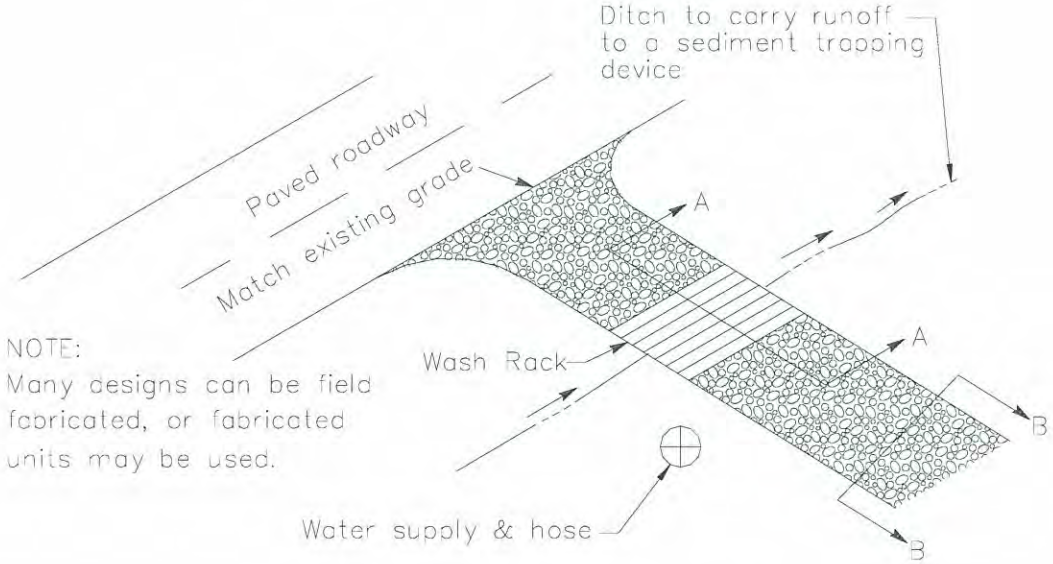
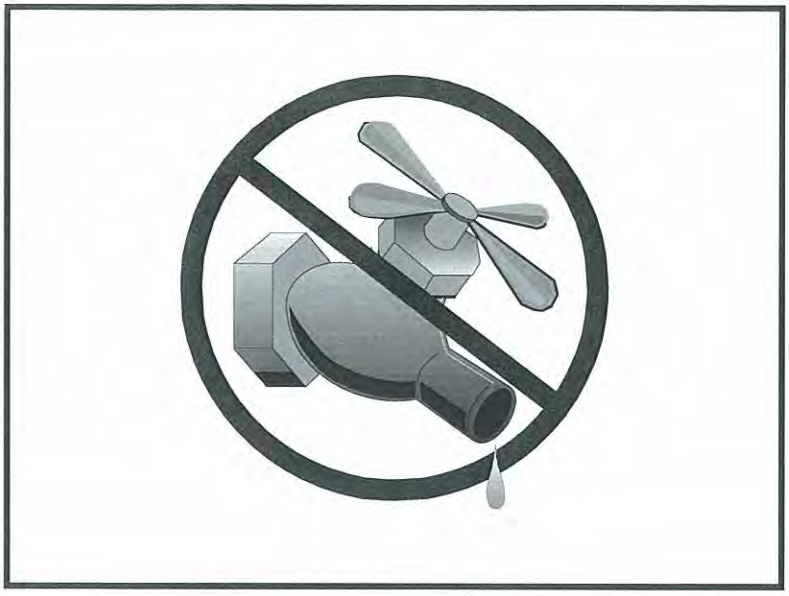


TYPICAL TIRE WASH
NOT TO SCALE

Water Conservation Practices NS-1



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Direct construction water runoff to areas where it can soak

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into the ground or be collected and reused.

- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Illicit Connection/Discharge NS-6

Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.
- Inspect site regularly during project execution for evidence

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of illicit connections, illegal dumping or discharges.

- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season
  - Unusual flows in sub drain systems used for dewatering
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the non-irrigation season
  - Non-standard junction structures
  - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

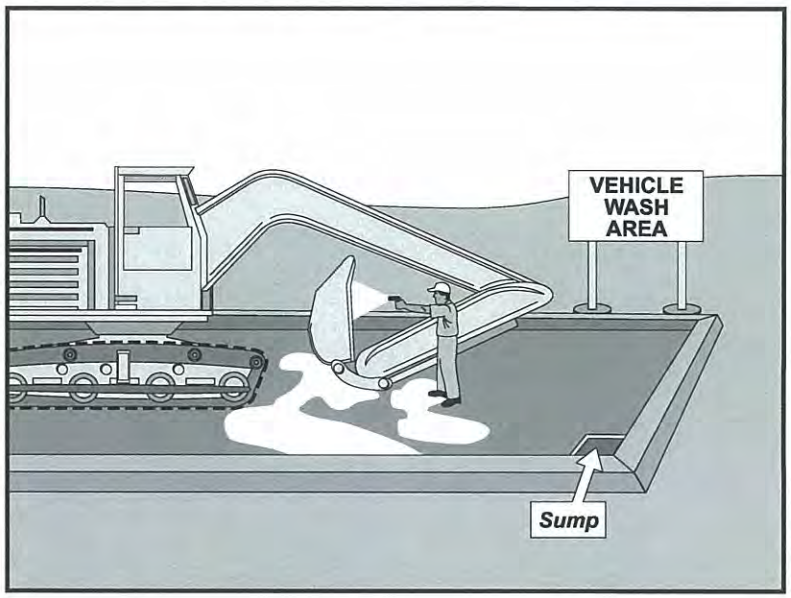
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning NS-8



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Inspection and Maintenance

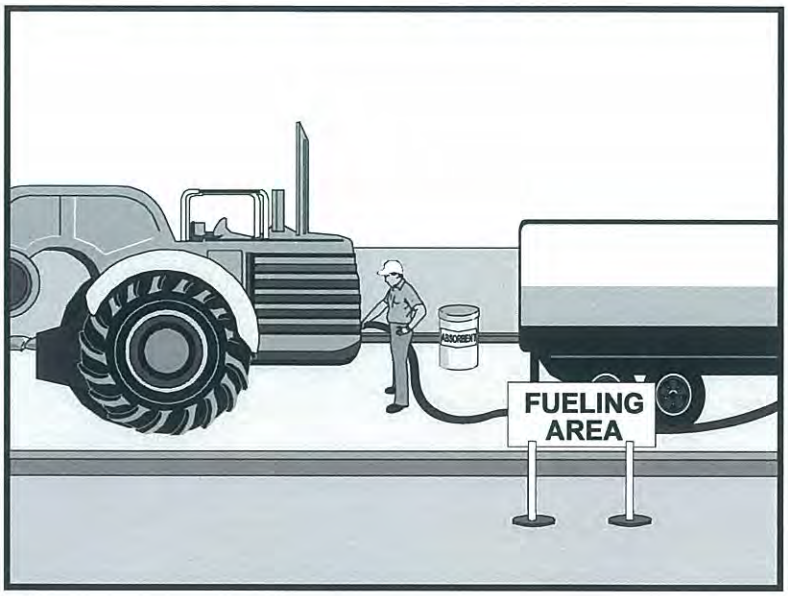
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Fueling NS-9



Categories

EC	Erosion Control	
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WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.
- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should

be disposed of properly after use.

- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

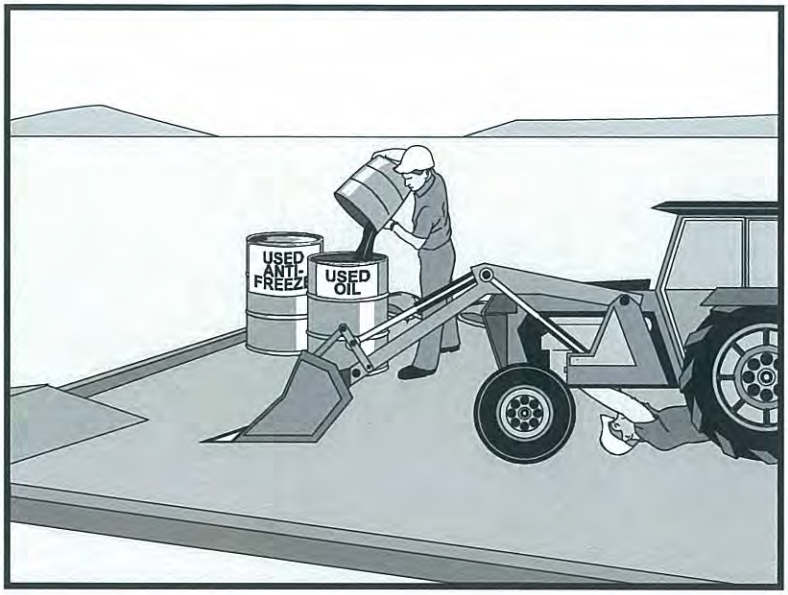
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and

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Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

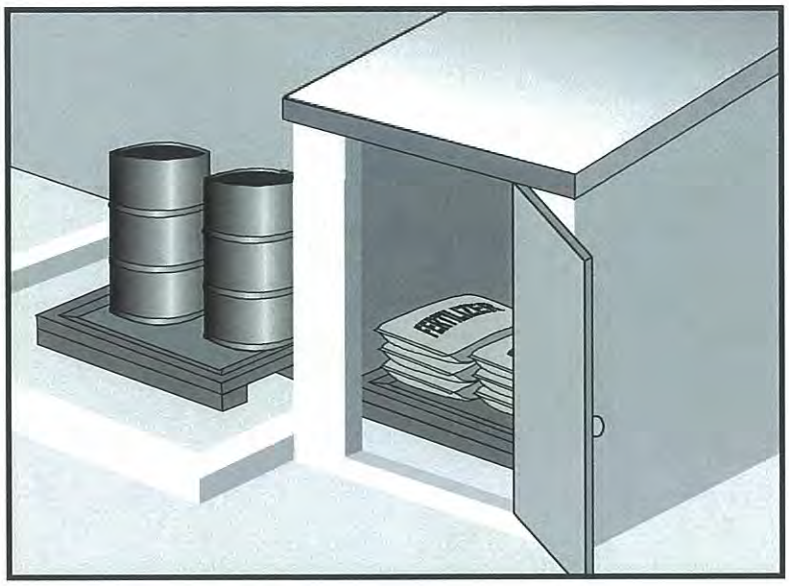
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Material Delivery and Storage WM-1



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

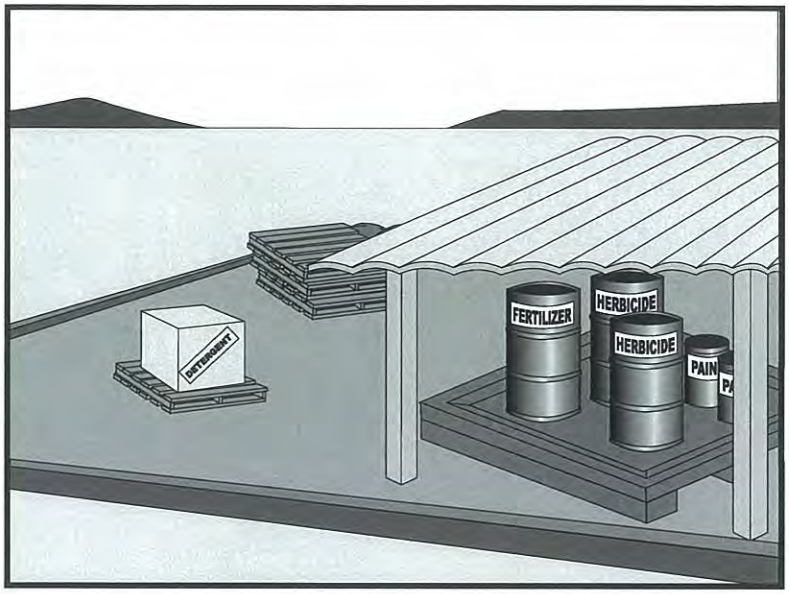
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use

WM-2



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

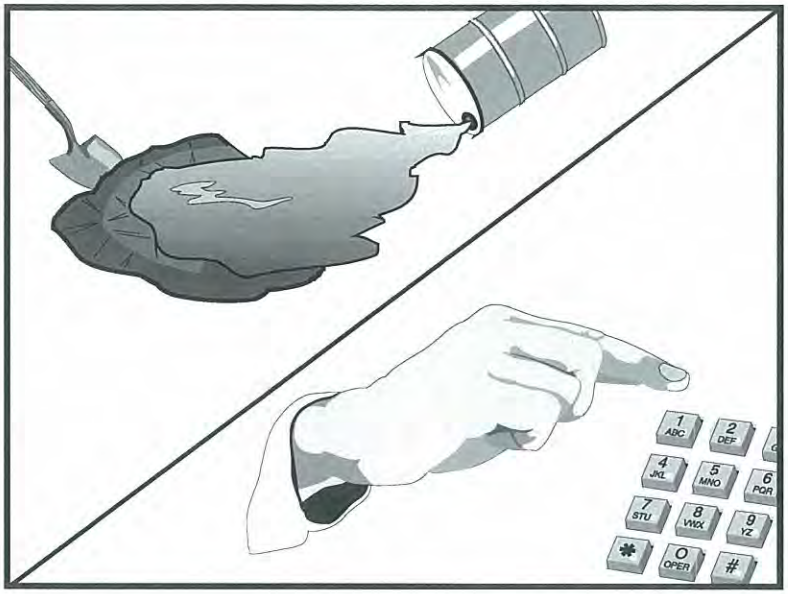
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Spill Prevention and Control WM-4



Categories

EC	Erosion Control	
SE	Sediment Control	
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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

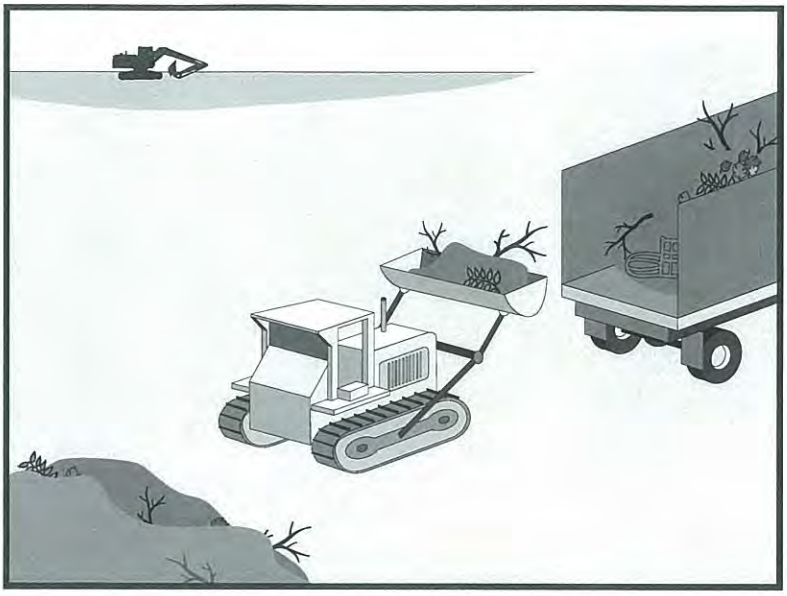
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials
- Highway planting wastes, including vegetative material,

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plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Contaminated Soil Management WM-7

Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities
  - Detected or undetected spills and leaks
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
  - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.
  - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT)
  - United States Environmental Protection Agency (USEPA)
  - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

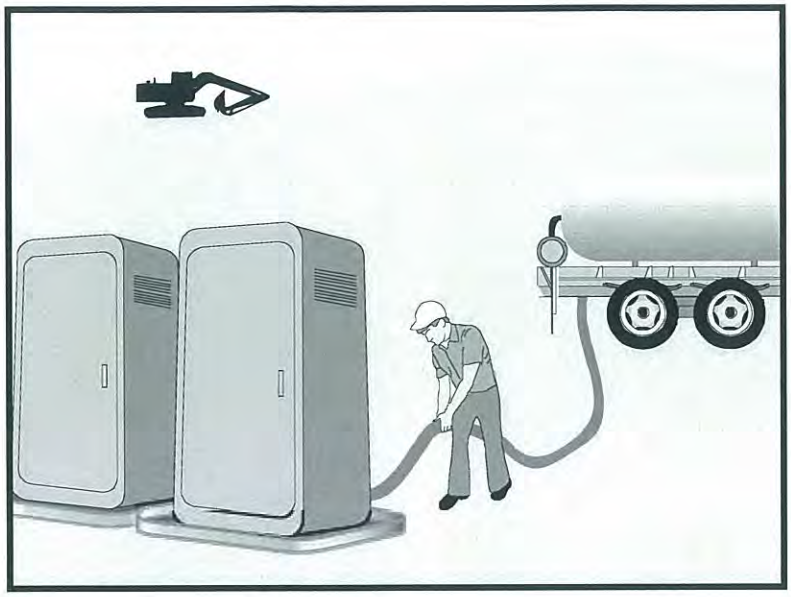
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Sanitary/Septic Waste Management WM-9



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

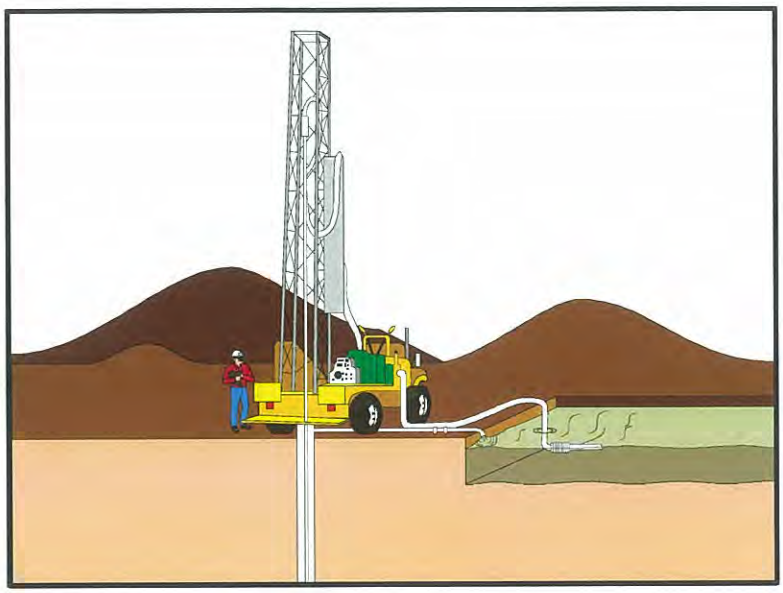
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Liquid Waste Management WM-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or concrete slurry residue (WM-8, Concrete Waste

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Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.
- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.
- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.
- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

APPENDIX H. CONSTRUCTION SITE INSPECTION REPORT FORM

Construction Site Inspection Report Form

Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater

Site Information

Construction Site Name:	
Construction stage and completed activities:	Approximate area of exposed site:

Weather and Observations

Date Rain Predicted to Occur:		Predicted % chance of rain:	
Estimate storm beginning: _____ (date and time)	Estimate storm duration:_____ (hours)	Estimate time since last storm: _____ (days or hours)	Rain gauge reading: _____ (inches)

Observations: If yes identify location		
Odors	Yes ☐	No ☐
Floating material	Yes ☐	No ☐
Suspended Material	Yes ☐	No ☐
Sheen	Yes ☐	No ☐
Discolorations	Yes ☐	No ☐
Turbidity	Yes ☐	No ☐

Site Inspections

Outfalls or BMPs Evaluated	Deficiencies Noted

Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:

Corrective Actions Identified (note if SWPPP change is needed)

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

Non-Visible Pollutant Sampling Field Log Sheets

Construction Site Name:	Date:	Time Start:
Sampler:		

Sampling Event Type:	☐ Stormwater	☐ Non-stormwater	☐ Non-visible pollutant

Field Meter Calibration

pH Meter ID No./Desc.: Calibration Date/Time:	Turbidity Meter ID No./Desc.: Calibration Date/Time:

Field pH and Turbidity Measurements

Discharge Location Description	pH	Turbidity	Time

Grab Samples Collected

Discharge Location Description	Sample Type	Time

Additional Sampling Notes:

Time End:

INSPECTION OF BMPs – Checklist				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Erosion Control				
Does the applied temporary erosion control provide 100% coverage for the affected areas?				
Are any non-vegetated areas that may require temporary erosion control?				
Is the area where erosion controls are used required free from visible erosion?				
Temporary Linear Sediment Barriers (Silt Fence, Fiber Rolls, Sandbag Barriers, etc.)				
Are temporary linear sediment barriers properly installed, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Tracking Control				
Is the entrance stabilized to prevent tracking				
Is the stabilized entrance inspected daily to ensure that it is working properly				
Are points of ingress/egress to public/private roads inspected and swept and vacuumed as needed?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Wind Erosion Control				
Is dust control implemented?				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of appropriately?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities?				

INSPECTION OF BMPs – Checklist				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Illicit Connection/ Discharge				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Owner/Operator been notified?				
Discharge Points				
Are discharge points and discharge flows free from visible pollutants?				
Are discharge points free of any significant sediment transport?				
SWPPP Update				
Does the SWPPP and Project Schedule adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the water pollution control drawings installed in the proper location(s) and according to the details in the SWPPP?				
General				
Are there any other potential concerns at the site?				

INSPECTION OF BMPs – Checklist				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Storm Water Monitoring				
Were there any BMPs not properly implemented or breaches, malfunctions, leakages or spills observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
If sampling indicated pollution of the storm water, were the leaks, breaches, spills, etc. cleaned up and the contaminated soil properly disposed of?				
Were the BMPs maintained or replaced?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				
If sampling indicated pollution of the storm water by the use of the soil amendments, is there a contingency plan for retention onsite of the polluted storm water?				
Did storm water contact stored materials or waste and run off the construction site? (Materials not in watertight containers, etc.)				

Renovado
20/May/2013

Estado Libre Asociado de Puerto Rico
Commonwealth of Puerto Rico
DEPARTAMENTO DE ESTADO
Department of State
Secretaría Auxiliar de Juntas Examinadoras
Office of the Assistant Secretary of State for Examining Boards

La Junta Examinadora de Ingenieros y Agrimensores
The Examining Board of Engineers and Surveyors

por la presente certifica que
hereby certifies that

Francisco Martir Valentin

por haber cumplido todos los requisitos de Ley, ha sido inscrito
en el Registro de esta Junta como
having met all the requirements of law, has been registered as:

Ingeniero Licenciado, RPA
Licensed Engineer, PRA

En testimonio del cual se expide esta licencia para el ejercicio de dicha profesión bajo el sello de la Junta.
In testimony whereof, this license is issued to practice as a professional, under the seal of the Board of Examiners.

En San Juan , Puerto Rico, hoy día 13 de junio de 2013.
In San Juan , Puerto Rico, on June 13, 2013.

Licencia Número: **7442**
Certificate Number:

Vencimiento: **12 de junio de 2018**
Expires: *June 12, 2018*

JUNTA EXAMINADORA DE INGENIEROS Y AGRIMENSORES
ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DE ESTADO

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APPENDIX I. MAINTENANCE, INSPECTION, AND REPAIR REQUIREMENTS

Attachment I

Maintenance, Inspection, & Repair Requirements

The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
TEMPORARY EROSION CONTROL BMPs		
EC-1, Scheduling	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Check weather forecast. Inspect and maintain BMPs prior to forecast storm events. ■ Minimize construction activities during storm events. ■ Stabilize soils after excavation activities have been completed using soil roughening or tracking.
EC-2, Preservation of Vegetation	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Replace Orange Fencing, As Needed
EC-4, Hydroseed	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Follow Manufacturers recommendations ■ Inspect irrigation systems for breaks if applicable ■ Re-seed in areas where seeds fail to germinate
EC-5, Soil Binders	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Follow Manufacturers recommendations ■ Reapply the selected soil binder as needed
EC-9, Earth Dikes and Drainage Swales	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Compact dike with earth moving equipment ■ Inspect Berm for washouts ■ Remove accumulated debris and sediment
EC-15, Soil Preparation or Roughening	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Track walk soil that will likely remain undisturbed for at least 14 days ■ The face of the slope should consist of loose, un-compacted fill 4-6 inches deep

The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
TEMPORARY SEDIMENT CONTROL BMPs		
SE-1, Silt Fencing	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events	■ Install on the contour ■ Trench (>6”) and key in (>12”) ■ Space posts <6’ apart and drive securely into the ground >18” ■ setback >3’ from the toe of the slope ■ Remove and dispose sediment appropriately ■ Repair broken stakes or ripped sections as necessary.
SE-3, Sediment Trap	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Excavation areas will be used as sediment traps (sediment will be removed during excavation activities) ■ Outlet/spillway to be installed at selected locations (See WPCD) to avoid overtopping BMP. Inspect outlet structure/spillway for damage or obstructions
SE-5, Fiber Rolls	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Install on slopes on level contours with the appropriate maximum interval (10’ – 20’) ■ Turn the ends of the roll up slope ■ Stake the fiber rolls into a 2 to 4” trench ■ If more than one roll is placed in a row, the rolls should overlap. ■ Remove sediment appropriately
SE-7, Street Sweeping	Daily during hauling operations and as needed As specified in the REAP	■ Not Applicable
SE-8, Sandbag Barrier SE-9, Straw Bale Barrier	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Clean sediment before and after each forecast storm event. ■ Maintain appropriate height and spacing (check dam height/slope)
WIND EROSION CONTROL BMPs		
WE-1, Wind Erosion	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Maintain water trucks and water distribution equipment in good order and fix leaks immediately. ■ Alter Water Amount or Work Times, As Needed.

The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
TRACKING CONTROL BMPs		
TC-1, Stabilized Entrance TC-3, Outlet Tire Wash	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Replace gravel as necessary. ■ Remove soil accumulation on rumble strip ■ Sweep surrounding areas
NON-STORM WATER MANAGEMENT BMPs		
NS-1, Water Conservation NS-6, Illicit Connection NS-8, Vehicle and Equipment Cleaning NS-9, Vehicle Fueling NS-10, Vehicle Maintenance	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Minimize water usage ■ Train employees/contractors on recognizing and reporting illegal discharges. ■ Maintain spill response materials, as needed. ■ Maintain Vehicles/Equipment Off-Site when feasible. ■ Conduct Vehicle/Equipment Cleaning at the Outlet Tire Wash Or the Appropriate Decontamination Area
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs		
WM-1, Material Delivery Storage WM-2, Material Use WM-4, Spill Prevention/Control WM-5, Solid Waste Management WM-7, Contaminated Soil Management	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Use materials immediately or store appropriately. ■ Maintain Spill Control Materials in there designated locations.
WM-10, Liquid Waste Management	Weekly and as necessary; Prior to forecast storm events; After rain events that result in runoff; and At 24-hour intervals during extended rain events As specified in REAP	■ Maintain drums on a secondary containment pallet or within secondary containment. ■ Maintain Spill Control Materials near waste water containment area.

APPENDIX J. TRAINING REPORTING FORM

Attachment J

Trained Contractor Personnel Log

Storm Water Management Training Log

Project Name: RCRA Interim Corrective Measure Soil Removal UXO 1 (SWMU 77), Naval Activity Puerto Rico (NAPR), Ceiba, PR

Project Number/Location: _____

Storm Water Management Topic: (check as appropriate)

- ❑ Erosion Control
- ❑ Sediment Control
- ❑ Wind Erosion Control
- ❑ Tracking Control
- ❑ Non-storm water management
- ❑ Waste Management and Materials Pollution Control
- ❑ Storm Water Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

COMMENTS:

_____

_____

APPENDIX K. ANNUAL REPORT DOCUMENTS INCLUDING SAMPLING AND ANALYSIS DOCUMENTS

Annual report documents will be provided as they are available.

APPENDIX E. SITE SAFETY AND HEALTH PLAN

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Final

Site Safety and Health Plan
RCRA Interim Corrective Measure
UXO 1, (SWMU 77) Soil Removal

NAVAL ACTIVITY PUERTO RICO (NAPR)
CEIBA, PUERTO RICO

May 2015

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Contract Number N62470-12-D-7016, CTO JM01

Final

Site Safety and Health Plan
RCRA Interim Corrective Measure
UXO 1 (SWMU 77) Soil Removal

NAVAL ACTIVITY PUERTO RICO (NAPR)
CEIBA, PUERTO RICO

May 2015

Prepared for:

Department of the Navy
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Prepared by:
USA Environmental, Inc.
Cape Environmental Management, Inc.
Right Way Environmental Contractors Inc.

Prepared under:

Contract Number N62470-12-D-7016, CTO JM01

SIGNATURE PAGE

SITE SAFETY AND HEALTH PLAN
FOR
INTERIM CORRECTIVE MEASURE UXO 1 (SWMU 77), SOIL REMOVAL
AT NAVAL ACTIVTY PUERTO RICO (NAPR)
CEIBA, PUERTO RICO

MAY 2015

I hereby certify that the enclosed Site Safety and Health Plan is proposed to be incorporated with Contract Number N62470-12-D-7016, Contract Task Order Number JM01, "*Interim Corrective Measure UXO 1 (SWMU 77), Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico*" and is submitted for government approval.

This Site Safety and Health Plan has been prepared to be in compliance with requirements of: Naval Facilities Engineering Command (NAVFAC) Southeast specifications for Contract Number N62470-12-D-7016; NAVFAC Southeast Contract Task Order (CTO) JM01 Performance Work Statement (PWS) entitled "*Interim Corrective Measure UXO 1 (SWMU 77), Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico*" *for Naval Facilities Engineering Command, Southeast,*" dated 06 June 2013; United States Army Corps of Engineers (USACE) "Safety and Health Requirements Manual" (EM 385-1-1; 15 Sep 2008 edition and incorporated changes); Navy/Marine Corps Installation Restoration Program Manual; and Occupational Safety and Health Administration (OSHA) standards.

Plan Reviewed By:

Robert B. Hernandez Jr. | 5-20-15

CAPE Site Safety and Health Officer: Robert Hernandez **Date**

Plan Prepared and Approved By:

5 - 20 - 15

CAPE Safety and Health Manager: Ken Beatty, CSP, CHST **Date**

Plan Concurrence: 05-20-2015

USA Senior Project Manager: Brian Mattingly **Date**

Plan Concurrence: Cheryl M. Riordan 5-20-15

USA Corporate Safety and Health Manager: Cheryl M. Riordan, CSP

Plan Accepted as a Submittal:

NAVFAC RPM: Stacin Martin **Date**

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Emergency Contact List
Emergency Hospital Route Map

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Subcontractor List

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SSHO (Robert Hernandez)
Alternate SSHO (Golnaz Ashouri)

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AHA-02 Land Surveying
AHA-03 Clearing and Grubbing
AHA-04 Sampling
AHA-05 Soil Excavation
AHA-06 Soil Stabilization
AHA-07 Grade Soil
AHA-08 Heavy Equipment Decontamination
AHA-09 Waste Transportation and Disposal
AHA-10 Site Restoration and Demobilization

LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AHA	activity hazard analysis
ANSI	American National Standards Institute
APR	air-purifying respirator
BBP	bloodborne pathogen
CAPE	Cape Environmental Management, Inc
CFR	Code of Federal Regulations
CHMM	Certified Hazardous Materials Manager
CIH	Certified Industrial Hygienist
CP	Competent Person
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
CSHP	CAPE Safety and Health Program
CSP	Certified Safety Professional
CTO	Contract Task Order
CY	cubic yard
dBA	decibels on the A-Weighted scale
DOH	Department of Health
DON	Department of the Navy
EAL	Environmental Action Levels
EM	Engineering Manual
EM-385-1-1	USACE Safety and Health Requirements Manual
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
EZ	exclusion zone
ºF	degrees Fahrenheit
GFCI	ground-fault circuit interrupter
GPR	ground penetrating radar
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAW	in accordance with
IDW	investigation-derived waste
LEL	lower explosive limit
LO/TO	lockout/tagout
LPM	liters per minute
MDAS	material documented as safe
MEC	munitions and explosives of concern
µm	micrometer
$\mu g/m^3$	micrograms per cubic meter
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
mm	millimeter
MDEH	material documented as an explosive hazard
MPPEH	material potentially presenting an explosive hazard
MSDS	material safety data sheet
NAVFAC	Naval Facilities Engineering Command
NIOSH	National Institute for Occupational Safety and Health

NTR	Navy Technical Representative
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
PAPR	powered air-purifying respirator
PEL	permissible exposure limit
PM	Project Manager
poly	polyethylene
PPE	personal protective equipment
ppm	parts per million
PQCP	Project Quality Control Plan
PRG	preliminary remediation goal
psi	pounds per square inch
PVC	polyvinyl chloride
PWS	Performance Work Statement
QA/QC	quality assurance/quality control
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
RSE	Removal Site Evaluation
SF	square foot
SHM	Safety and Health Manager
S&H	safety and health
SDS	safety data sheets
SOP	standard operating procedure
SM/QCM	Site Manager/Quality Control Manager
SSHP	Site Safety and Health Plan
SSHO	Site Safety and Health Officer
STEL	short-term exposure limit
TCRA	time-critical removal action
TLV	threshold limit value
TWA	time-weighted average
USACE	United States Army Corps of Engineers
WBGT	wet-bulb globe temperature

1. SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

This Site Safety and Health Plan (SSHP) presents contractor safety and health (S&H) procedures to be implemented by the USA Environmental Team which consists of USA Environmental Inc (USA), Cape Environmental Management, Inc (CAPE) and Right Way Environmental Inc.; for services associated with the Naval Facilities Engineering Command (NAVFAC) Southeast for the interim corrective measure soil removal at UXO 1 (SWMU 77) at Naval Activity Puerto Rico, Ceiba, Puerto Rico project.

The SSHP is implemented for the NAVFAC Southeast (Contract Number N62470-12-D-7016) and the USA Environmental Team or USA Team.

The SSHP has been prepared to meet requirements of: Occupational Safety and Health Administration (OSHA) standards, 29 Code of Federal Regulations (CFR) Part 1910 and 29 CFR Part 1926; U.S. Army Corps of Engineers (USACE) "Safety and Health Requirements Manual" (EM 385-1-1; 15 Sep 2008 edition and incorporated changes); Navy/Marine Corps Installation Restoration Program Manual; and NAVFAC Southeast performance work statement (PWS) entitled "*Interim Corrective Measure UXO 1 (SWMU 77), Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico*" *for Naval Facilities Engineering Command, Southeast,*" dated 06 June 2013.

This SSHP serves as the primary S&H guidance for USA Team operations necessary to accomplish project objectives. The purpose of the SSHP is to identify and evaluate S&H hazards at the project worksite and to prescribe safety control measures to be implemented. This SSHP has been organized into the following sections as presented in EM 385-1-1 Section 28 "Hazardous Waste Operations and Emergency Response (HAZWOPER)":

- Site Description and Contamination Characterization
- Hazard/Risk Analysis
- Staff Organization, Qualifications, and Responsibilities
- Training
- Personal Protective Equipment (PPE)
- Medical Surveillance
- Exposure Monitoring/Air Sampling Program
- Heat Stress
- Standard Operating Safety Procedures, Engineering Controls, and Work Practices
- Site Control Measures
- Personal Hygiene and Decontamination
- Equipment Decontamination
- Emergency Equipment and First-Aid
- Emergency Response and Contingency Procedures.

The USA Team Project Manager (PM), dual-hat Site Manager/Quality Control Manager (SM/QCM), Site Safety and Health Officer (SSHO), and Safety and Health Manager (SHM) primarily implement the SSHP in coordination with the NAVFAC Navy Technical Representative (NTR) and Remedial Project Manager (RPM). Compliance with the SSHP is required of all USA Team personnel, subcontractors, and associated third parties onsite. A copy of the SSHP will be maintained onsite during work activities and will be available for inspection and review by site or agency personnel. Field personnel will review applicable aspects of the SSHP before site work and will sign an acknowledgment form (see ex. Attachment 1) indicating that they have reviewed the pertinent aspects of the plan.

The contents of the SSHP may be revised and/or amended should additional information become available regarding the hazards present at the site and/or should significant changes occur in the scope of work, operational procedures, site hazards, and/or hazard control measures. The SSHP may be modified by the SSHO upon review and approval of the SHM, PM, and NTR. Changes to the SSHP are documented on a SSHP Change Approval form. Field personnel are informed of changes to the SSHP through safety meetings and written or revision to the SSHP.

1.1 SITE INFORMATION

Originally established in 1941 as Fort Bundy, the base was commissioned in 1943 as a Naval Operations Base and re-designated as Naval Station Roosevelt Roads (NSRR) in 1957. NSRR operated as a Naval Station until March 31, 2004, when NSRR underwent operational closure. Based on the ceasing of military operations, the name for NSRR was changed to NAPR on April 1, 2004. Currently, NAPR occupies more than 8,600 acres on the east coast of Puerto Rico, along Vieques Passage with Vieques Island lying approximately 10 miles to the east (Figure 2-1).

SWMU 77 is located on the peninsula at Punta Medio Mundo on the northeastern boundary of Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico. SWMU 77 covers approximately 66 acres and historically was used as a small arms range. SWMU 77 consists of six subareas: the current Pistol Range Subarea, Former Pistol Range Subarea, Rifle Range Subarea, Potential Open Burn/Open Detonation (OB/OD) Subarea, Potential Munitions Trench Subarea, and the Detonation Area Near Concrete Pad Subarea. The small arms range which consisted of the Rifle Range and Pistol Range subareas were closed on January 1, 2010. This work plan covers the interim corrective measure at three subareas: the Former Pistol Range Subarea, the Pistol Range Subarea, and the Rifle Range Subarea. Locations of each SWMU 77 Subarea included in the interim corrective measure are depicted in Figure 2-2. The OB/OD Subarea and the Potential Munitions Trench Subarea were not included in the interim corrective measure because the Phase I RFI at these subareas were inconclusive and required more investigations at the time the interim corrective measure was contracted.

1.2 CONTAMINATION CHARACTERIZATION

In 2011, a Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at SWMU 77 identified four areas with high soil lead concentrations as a result of previous military range use. Previous investigations and site work identified Munitions and Explosives of Concern (MEC) at the site; however, no MEC was identified during the RFI field investigation. The Phase I RFI recommended conducting a Full RFI at SWMU 77. Background information, as presented in the Full RFI Sampling and Analysis Plan (SAP), for each of the four subareas at SWMU 77, is discussed below.

Former Pistol Range Subarea

The Former Pistol Range Subarea is overgrown with trees and no visible evidence remains of the former pistol range located northeast of the current pistol range and southwest of the Detonation Area Near Concrete Pad Subarea. The Phase I RFI investigated surface soil for nitroglycerin (NG) and metals along each side of the subarea to investigate potential historical berm locations and inside the perceived historical range boundaries. The Phase I RFI found that at the berm, lead concentrations were elevated and presented a human health and ecological risk. The most highly contaminated area was encountered in the northwestern area of the subarea (TetraTech, 2012).

Pistol Range Subarea

The Pistol Range Subarea is located in a level area north of the entrance road to SWMU 77. The Pistol Range was closed January 1, 2010 and until that time was maintained via grass cutting. An earthen berm that served as the bullet backstop is present just beyond the target area. There are six firing lines across two 50-foot-wide side-by-side ranges. The southern half of the range was used exclusively since 2004. The Phase I RFI investigated surface soil for NG at the firing lines and metals and explosives at the berm area. The Phase I RFI found that at the berm, lead concentrations were elevated and presented a human health and ecological risk (TetraTech, 2012).

Rifle Range Subarea

The Rifle Range Subarea is a 500-yard narrow feature centrally located in SWMU 77 and orientated such that shots are fired toward the outer point of the peninsula. Construction of the range occurred sometime between 1940 and 1958 and was closed for use on January 1, 2010. The range has 100-yard, 200-yard, 300-yard, and 500-yard elevated firing lines and a short-yardage range formerly used as a pistol range. The short-yardage range is located just in front of a fixed target berm. The target berm consists of a constructed earthen berm that served the short-yardage range, a concrete wall at the rear of the earthen berm equipped with a target carrier mechanism to raise (and lower) targets, and a natural steeply wooded hillside beyond the earthen berm/concrete wall that serves as the rifle range backstop for these elevated targets. The Phase I RFI investigated surface soil for NG at the firing lines and metals and explosives at the berm/embankment area. NG was a potential risk concern at the 200-yard firing line for the Rifle Range. At the earthen constructed berm area/wooded embankment, lead was present at elevated concentrations (TetraTech, 2012).

Figure 1 shows the site location. Additional project design drawings are in the Work Plan, Appendix B.

1.3 SCOPE OF WORK

Construction services related to this project involve the provision of all services, equipment, labor, and material required to perform the task order. The field work elements specific to this project are reviewed below:

1.3.1 Mobilization and Site Preparation

Mobilize all necessary equipment, labor and materials to the project site to perform the scope of work. Install temporary construction fencing and pedestrian control signs, caution tape, and/or warning signs, as needed, to delineate the work area. Initial work zone boundaries will include the following: Exclusion Zone (EZ), including restricted and regulated areas; Contamination Reduction Zone (CRZ); and Support Zone (SZ). Set-up a temporary shelter (canopy) on site. Provide a portable toilet onsite during field activities. Set-up an access control point and health and safety facilities (first aid, eye wash station, etc.). Minor clearing and grubbing actions will be performed for delineation of the work area. Establish survey control points for the construction and as built surveys. Qualified UXO Technicians will perform MEC avoidance activities throughout all intrusive operations, using geophysical equipment to determine if anomalies are in the area where intrusive operations are to occur. If an anomaly is located in an area where intrusive operations are to occur, the operation can either be moved to an anomaly-free location, or the UXO Technicians can investigate the anomaly. If it is MEC, it will be inspected and will undergo a blow in place (BIP) disposal operation if it is determined to be Material Potentially Presenting an Explosive Hazard (MPPEH). If the item is Material Documented as Safe (MDAS), it will be inspected by two qualified UXO Technicians and will be certified as MDAS and containerized until the end of the project field work, when it will be sent to a qualified recycler.

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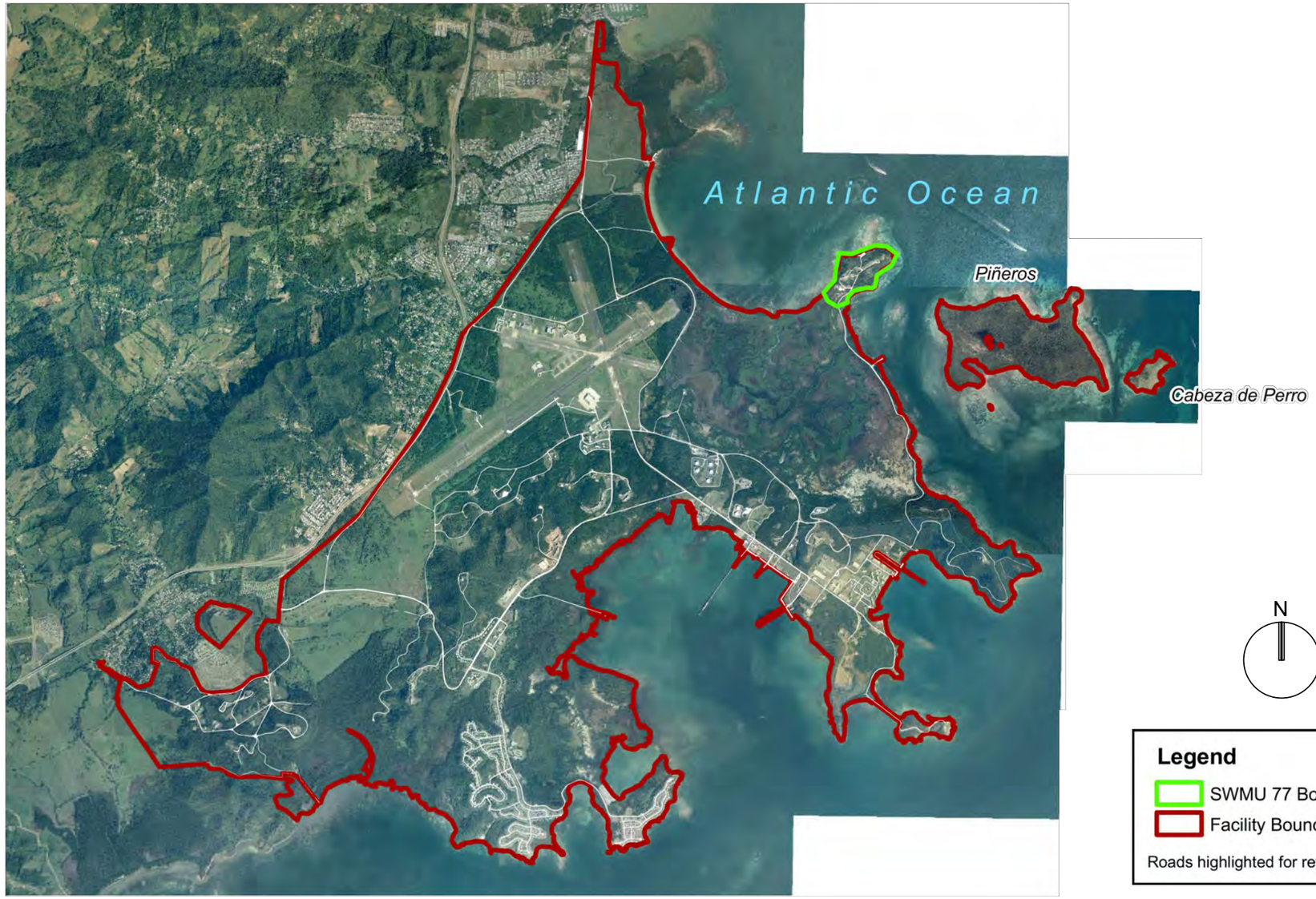

6,000 0 6,000 Feet

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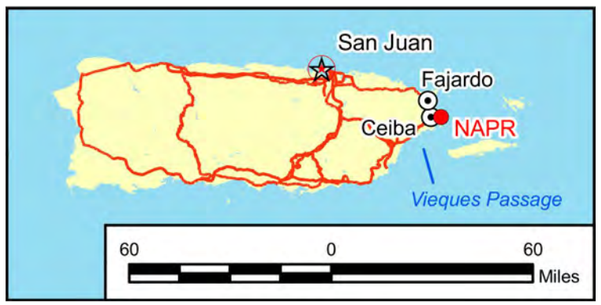
Legend

SWMU 77 Boundary

Facility Boundary

Roads highlighted for reference purposes.



SYM	DESCRIPTION	DATE	APPR

NAVFAC

SEAL

CAPE
500 Pinnacle Court
Suite 100
Norcross, GA 30071
(770) 908-7200

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES K.N DRW C.R CHK C.W

<<PM/TM>>

BRANCH MANAGER

CHIEF ENG/ARCH

<<CO>>

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - NAPR
PUERTO RICO (NAPR)
NAVAL ACTIVITY
CEIBA
PUERTO RICO

UXO 1 (SWMU 77) SOIL REMOVAL

SITE LOCATION MAP

SCALE: AS NOTED

EPROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

FIGURE 2-1 OF 2

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\OCONUS\Federal\NAVYPACDIV\30128.001.100 (Ceiba PR)\CAD Files\Work Plan\Figures\UXO_RFI SWMU 77 Fig1.dwg LAYOUT NAME: 1 PLOTTED: Friday, June 28, 2013 - 5:33pm USER: crios

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The USA Team will coordinate with the RPM to establish a parking area for contractor use. A laydown area for project site equipment and supplies will be established for storage and staging purposes. A field office shelter will be established for project site operation, management and administration purposes.

Decontamination facilities will be installed during the temporary facility construction phase. The decontamination facility will be constructed to be used for equipment and personnel decontamination. The decontamination facility delineates the support zone from the contamination reduction zone (CRZ). All areas beyond the CRZ are considered the hot zone and cordoned off as required with temporary safety fencing and proper signage. Additionally, the USA Team will construct an equipment decontamination pad with one layer of 30 mil HDPE and crushed stone and bermed on all sides with sandbags.

Vehicles and trucks used for transport will not enter exclusion zone areas; personnel entering on foot use disposable boot covers in order to prevent migration of contaminants.

A 50 ft. by 90 ft. stabilization area will be constructed in the rifle firing range adjacent to each removal area at the SAR prior to excavation activities. The stabilization area is bermed to prevent storm water runoff from entering the area, the floor is covered with 30-mil HDPE liner, and the staged material is covered using 6-mil liners. Excavated soils are hauled to the stabilization area using 24 c/y articulated trucks. The trucks are unloaded onto the lined area where the stabilization agent is applied. Soils are mixed with the designed stabilizing agent using the excavators and the dozer. At the conclusion of the project, the stabilization area is over excavated to a depth of 3 inches and the soils treated with the stabilization agent prior to disposal.

Erosion control measures will be implemented at the SAR prior to excavation. Storm water will be controlled by the use of Best Management Practices (BMP) such as silt fences, temporary diversion ditches, dikes, and slope drains, as needed, to prevent the release of contaminated sediment through precipitation. Straw bales are placed at the perimeters of all sloped project work areas and around staging areas that handle contaminated materials. As a BMP, the control measures are monitored and accessed continually during the lifecycle of the project. Erosion control measures are presented in the SWPPP, included as Appendix D of the project work plan.

Environmental pollution and damage as defined is the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural, or historic perspective. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources. This includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; and other pollutants.

Environmental Protection Plan elements will be provided as a part of the work plan and includes information on Emergency Planning and Community Right-to-Know Act (EPCRA) reporting requirements. Additionally, this plan describes protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during soil removal activities.

1.3.2 Land Surveying

The USA Team will utilize a Commonwealth of Puerto Rico-licensed surveyor to conduct a survey of the excavation areas prior to and upon completion of field work.

1.3.3 Sampling

Prior to mobilization, one composite soil sample will be collected consisting of soil from each subarea and will be placed into a decontaminated 5-gallon container. Soil collected into the composite sample will be biased in the areas identified with higher contaminant concentrations in order to ensure that a representative contaminated sample will be collected. The sample will be tested for total lead. This sample will be taken to Jaca Sierra laboratory (a geotechnical laboratory) in Trujillo Alto, Puerto Rico, to perform treatability testing and to establish mix ratios for the stabilizing reagent that is added. The treatability study is discussed in Section 7.8.1.

Once the stabilization agent applied to the soil has been given adequate time to react with the soil, a sample will be collected to determine if the stabilized soil meets waste acceptance criteria as established by the landfill. The stabilization agent will be reapplied as necessary until the soil is determined to meet waste acceptance criteria. A sample analyzed for the full TCLP suite is collected for every 5,000 tons of solid waste generated in accordance with the receiving facility's disposal criteria.

1.3.4 Soil Excavation

For each of the four areas of concern (AOCs) located and staked by a Puerto Rico-licensed surveyor, the soil will be excavated, transported on site to the stabilization area, stabilized using a stabilization agent, and loaded for transportation and disposal as special waste. Upon completion of excavation in a grid pattern, the grid will be flagged to protect the area from being contaminated by the site traffic. Excavation will then proceed in the adjacent grid. Intermediate restoration measures such as slope reduction and erosion control will be implemented to ensure safe working conditions and reduce erosion. For this project Slope Stability is not a concern due to the shallowness of the excavations. The greatest depth of excavation should not be any deeper than 3 ft Below Ground Surface (bgs). According to all information received with the RFP, the contamination is 3 ft bgs or shallower. Soil quantities to be excavated by area consist of:

- Former Pistol Range Subarea: 691 CY removed to a maximum depth of 2 ft bgs
- Pistol Range Subarea: 2,517 CY removed to a maximum depth of 3 ft bgs
- Rifle Range Subarea: 6,725 CY removed to a maximum depth of 3 ft bgs

A post-construction as-built survey by a licensed land surveyor will be conducted to verify locations and elevations to construct a record drawing for the Removal Verification Report.

MEC Construction Support

Munitions and Explosives of Concern (MEC) construction support will be provided based on historical site findings. It is not anticipated that any MEC will be located during the excavation and disposal of soils. USA is providing UXO Technicians who will perform construction support during all intrusive operations on the site. The UXO Technician will use geophysical equipment to search for anomalies in the area where the intrusive operations are to occur. If anomalies are detected, the intrusive operation will be moved, if this is feasible. If the location of the intrusive operation cannot be moved, the UXO Technicians will investigate the anomalies to determine if it is MEC and whether it is MPPEH or MDAS. If any suspected MEC are discovered while work is being conducted at the site, the following precautions will be conducted, but are not limited to:

- Stop all work in the area and isolate area of concern

- Notify the CO, NTR, and RPM
- UXO Technicians inspect the item to determine if it is Material Documented as an Explosive Hazard (MDEH) or MDAS
- If the MEC is identified as MDEH, request contract modification to allow USA to perform disposal operation from RPM
- USA UXO Technicians establish exclusion zone based on DoD 6055.09-M and perform disposal
- After disposal operation, UXO Technicians inspect area of disposal to ensure that MEC item was completely destroyed. If not, the MEC disposal operation is repeated.
- Resume work only after proper disposal and/or removal of the MEC has occurred and clearance given by the USA.

1.3.5 Soil Stabilization

The composite soil sample collected prior to mobilization will be sent to Jaca Sierra laboratory in Trujillo Alto, Puerto Rico to perform treatability testing and to establish mix ratios for the stabilizing reagent. To perform the testing, the laboratory homogenizes the composite sample, and an aliquot of the soil sample is removed and analyzed for total and TCLP metals to determine the baseline concentrations of the metal residues. Portions of the homogenized sample are mixed with a reagent known to be effective for the chemical fixation of lead. These reagents include bentonite mixed with Portland cement or cement kiln dust. Four distinct reagent/waste addition levels are prepared for each reagent system. The mix ration is initially based on the specific chemical and physical properties of the sample material and adjusted based on the outcome of treatability sample testing. Sample collection, mixing and testing is performed by RWEC and Puerto Rico Environmental Quality Laboratories, Inc.

The excavated soil will be transported to the stabilization area at the rifle range and stockpiled. The stockpiled soil will be covered and bermed to prevent runoff and run-on. The engineered stabilization agent capable of stabilizing lead and other metals in soil and effectively reducing their leachability to meet disposal criteria will be blended with the soil. The reagent dosage was determined based upon treatability study results. The stabilization agent will be applied at a rate sufficient to ensure that the TCLP leachability of metals in the treated soil passes the universal treatment standards in accordance with the land disposal restrictions for Resource Conservation and Recovery Act. Once the stabilization agent has been given adequate time (Typically 8 to 24 hours) to react with the soil, a sample will be collected to determine if the stabilized soil meets waste acceptance criteria as established by the landfill. The stabilization agent is reapplied as necessary until the soil is determined to meet waste acceptance criteria. A sample analyzed for the full TCLP suite is collected for every 5,000 tons of solid waste generated in accordance with the receiving facility's disposal criteria.

1.3.6 Waste Transportation and Disposal

In accordance with the waste management plan, the treated soils will be transported to Waste Management's El Coqui Landfill, Humacao, a RCRA Subtitle D permitted facility in Puerto Rico. The USA Team will load the materials in lined dump trucks that transport the materials to the landfill. Each load will be manifested as required by the Commonwealth. The disposal manifest will be signed and returned documenting the disposal weight. Theses manifests will become an appendix to the final report. All trucks will be inspected prior to departing the site to prevent the spread of nuisance soils and foreign objects on public roadways.

Confirmation samples will be collected from the excavated soil area by an independent third party subcontracted by NAVFAC SE. The USA Team will coordinate with NAVFAC SE to expedite confirmation sampling.

1.3.7 Site Restoration and Demobilization

Remove construction-related debris from the site. Decontaminate equipment using a dry decontamination method. Restore damage to the surrounding areas from this project to its original condition. Conduct a final inspection with NAVFAC Southeast following completion of the fieldwork. Demobilize equipment, material, and personnel from the project site.

2. HAZARD/RISK ANALYSIS

Site hazards, hazard control measures, and risk analysis information for chemical, physical, and biological hazards that are likely to be encountered during project work are reviewed in this section of the SSHP. Activity Hazard Analyses (AHAs) associated with this project is also indicated.

2.1 CHEMICAL HAZARDS

The primary chemical hazard that will be present during site work is lead-impacted soil. Information on the nature and extent of contamination at the site was obtained from the TetraTech RI/FS report (TetraTech, 2012). Other chemical hazards for site work are associated with products to be used to perform the work.

2.1.1 Nature and Extent of Contamination

The RI indicated that lead is the only site-related chemical of concern and that soil is the only medium of concern. Surface and subsurface soil samples within and surrounding a grid system were collected to analyze the samples for lead to delineate the lateral and vertical extent of contamination to the project-specific action level.

Table 2-1 below provides surface and subsurface soil lead concentrations in excess of the project specific action level.

Table 2-1 Surface and Subsurface Soil Lead Concentrations

Location	Depth (feet bgs)	Lead Concentration (mg/kg)
Former Pistol Range Subarea	2.0	12,295
Pistol Range Subarea	3.0	58,400
Rifle Range Subarea	3.0	89,000 and 118,000

Table 2-2 below provides chemical hazard information. The table includes a summary of the health effects, potential routes of entry, and the OSHA permissible exposure limits (PELs) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) for these hazardous substances (lowest value). These occupational exposure limits (OELs) are reported as 8-hour time-weighted average (TWA), 15-minute short-term exposure limit (STEL), and/or ceiling limit values and also by a SKIN notation if the chemical substance may be absorbed into bloodstream through skin, mucous membranes, and/or eye and contribute to overall exposure.

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Table 2-2 Chemical Hazard Information

Compound	Occupational Exposure Limit	Routes of Exposure/ Primary Health Effects/ Other Comments
Lead (metal & inorganic compounds)	30 µg/m3 (AL); 50 µg/m3 (PEL); Note: see OSHA 29 CFR 1926.62	Inhalation, ingestion and dermal routes of exposure. Gastrointestinal disturbances; Anemia; Neuromuscular dysfunction; Encephalopathy; Nephropathy.

LEGEND:

µg/m^3:	micrograms per cubic meter
TWA:	time-weighted average
AL:	OSHA 8-hour TWA action level
PEL:	OSHA 8-hour TWA permissible exposure limit
ACGIH:	American Conference of Governmental Industrial Hygienists
TLV-TWA:	ACGIH 8-hour TWA threshold limit value

2.1.2 Airborne Dust Equivalent Action Level Calculation

An equivalent airborne dust action level can be calculated that represents the predicted maximum non-volatile contaminant airborne dust concentrations that could be encountered. Airborne dust action levels are based on the cumulative total of the highest soil sample concentrations of a non-volatile contaminant obtained during site assessment soil sampling. Airborne dust concentrations exceeding the action level trigger use of additional dust control measures. The action level is also used as an upgrade concentration for respirator use by workers.

The equivalent airborne dust action level is calculated using the following formula:

$$EI_{mix} = \frac{(EL\ mg/m^3)}{(Conc.\ mg/kg) \times (SF)} = \frac{(10^6\ mg/kg) \times (EL\ mg/m^3)}{(Conc.\ mg/kg) \times (SF)}$$

Legend:

EI_{mix}:	Total dust concentration where contaminants would be at their PEL/TLV
EL:	Exposure limit (lower of PEL/TLV) of specific non-volatile soil contaminant (mg/m^3)
10^6:	Conversion factor
Conc.	Estimated maximum specific contaminant soil concentration (mg/kg)
SF:	Safety factor (1-10X depending upon confidence with soil sampling data)

Reference: Safety Now! Controlling Chemical Exposures at Hazardous Waste Sites with Real-Time Measurements, Christopher S.E. Marlowe, CIH, 1999

2.1.3 Lead Airborne Dust Equivalent Action Level Calculation

Maximum concentrations of lead in surface and subsurface soil at depths of 3 feet or less (maximum depth of soil disturbance on this project) are 118,000 mg/kg. Lead Airborne Dust Equivalent Action Level Calculation: Lead was found in surface soil at a maximum concentration of 118,000 mg/kg. The 8-hour TWA PEL for lead is 0.05 mg/m^3. If a safety factor of 2 is used, the calculated lead-equivalent airborne dust action level is 0.21 mg/m^3.

2.2 RISK ANALYSIS/EXPOSURE ASSESSMENT

Earthwork/grading; soil removal to a depth of 3 feet; and removal of shrubs and small trees activities will be performed. These activities will involve the disturbance of lead contaminated soil. It is anticipated that there will be the potential for inhalation and dermal exposure to contaminated soil during these activities.

Equipment operators will be operating from inside enclosed cab heavy equipment. Water spray from a water truck will be used to minimize generation of airborne dust. Personnel will not be directly handling the contaminated soil. Decontamination procedures will be implemented so there will be minimal potential for skin contact. No eating, drinking or smoking will be allowed in the exclusion zone and decontamination procedures will be implemented so the potential for ingestion of contaminated soil is minimal. Modified Level D protection and Level C will be used as a precautionary measure during these activities.

An equivalent airborne dust action level was calculated for lead. The amount of airborne dust to allow a significant inhalation exposure would need to be 0.21 mg/m^3 (includes a safety factor of 2). Airborne dust monitoring will be conducted during lead-impacted soil handling. If levels exceed the equivalent airborne dust action level then additional water application for dust control will be implemented and air-purifying respirators (APRs) with P100 cartridges will be used. Lead monitoring will additionally be conducted to document a negative exposure assessment.

2.2.1 Hazard Communication Plan

A Hazardous Substances Inventory List will be prepared by the SSHO and will include approximate quantities that will be on site at any given time and a site map showing the locations where the hazardous substances are stored. The SSHO will maintain material safety data sheets (MSDSs)/Safety Data Sheets (SDSs) on site for hazardous substances to be used during site work with an explanation of how the hazardous substances will be used. A listing of the type of hazardous substances with anticipated use during site fieldwork is provided below

- **Fuels**: Fuel for vehicles and drilling equipment;
- **Lubricants**: Oil, grease, and other lubricants for equipment;
- **Fire Extinguishing Agent**: Dry chemical for fire extinguishers;
- **Cleaning Solutions**: Simple Green or similar;
- **Paint**: Spray paint for marking of locations;
- **Portland Cement:** Flowable fill.

Note: On May 25, 2012, changes to the OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200) took effect, bringing U.S. rules into alignment with the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals to better protect workers from hazardous chemicals and help American businesses compete in a global economy. Implementation of the revised standard has a phase-in period and will be fully implemented in 2016. Employers must train workers on the new label elements and SDS format by December 1, 2013. Chemical manufacturers, importers, distributors, and employers must comply with all modified provisions of the final rule by June 1, 2015. However, distributors may ship products labeled by manufacturers under the old system until December 1, 2015. By June 1, 2016, employers must update alternative workplace labeling and hazard communication programs as necessary, and provide additional worker training for new identified physical and health hazards. During this transition period, all chemical manufacturers, importers, distributors, and employers may comply with either 29 CFR 1910.1200 (this final standard), or the current standard, or both.

The harmonized standard will classify chemicals according to their health and physical hazards, and establish consistent labels and safety data sheets for all chemicals made in the U.S. or imported from abroad. Some of the major changes include:

Hazard Classification: The definitions for most of the physical and health hazards have been changed. There are several new hazards and drastically different definitions for many of the hazard classes.

Labels: Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each hazard class and category. Standardized precautionary statements must now be provided on each label. There are nine pictograms under the GHS to convey the health, physical and environmental hazards. The final Hazard Communication Standard requires eight of these pictograms, the exception being the environmental pictogram, as environmental hazards are not within OSHA's jurisdiction.

Safety Data Sheets (formerly called Material Safety Data Sheets): Must now be in a 16-section format, with precise requirements for what must be in each section.

Information and Training: Employers are required to train workers by December 1, 2013, on the new label elements and safety data sheet format to facilitate recognition and understanding.

2.3 PHYSICAL HAZARDS

The primary physical hazards that may be encountered during site work are reviewed below.

2.3.1 Fire Protection

Fire hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10); Diesel and gasoline fuel will be used for vehicles, heavy equipment, and machinery operation. MEC operations (AHA-11; AHA-12 and AHA-13) also present fire hazards. Fire extinguishers will be available onsite. A Hot Work Permit may be required at the site.

Underground Utilities: Underground utility hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10) as well as MEC construction support operations (AHA 11). Underground utility lines may be present at the site. Underground utility clearance procedures will be implemented prior to drilling at the site. The markings and locations of any utilities will be maintained throughout the duration of the project. As needed, utility companies will be contacted to identify the location of buried utilities prior to intrusive operations. In addition, a geophysical survey, or equivalent, will be conducted to determine the location of subsurface utilities, particularly in areas where local utility companies are not able to locate buried utilities.

Overhead Utilities: Overhead utility hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10) and MEC operations (AHA-11; AHA-12; and AHA-13). The presence of overhead utilities will be surveyed before bringing equipment with high extensions (e.g., drill rig) into the work area. Equipment that has high overhead projections is not allowed to operate within a 10-foot radius (minimum distance) of overhead power lines. Overhead high-voltage power lines more than 50,000 volts require additional distance. Verify the voltage of overhead lines and check against EM 385-1-1 Section 11F, Table 11-1 to ensure that the required minimum distance from overhead lines is

maintained. EM 385-1-1(11)(F) requires the following minimum clearance from energized overhead electrical lines for the indicated voltages: 0 to 50 kilovolts (kV)) (10 feet); 51 to 200 kV (15 feet); 201 to 350 kV (20 feet); 351 to 500 kV (25 feet); 501 to 750 kV (35 feet); 751 to 1,000 kV (45 feet); Over 1,000 (as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Heavy Equipment Operation: Heavy equipment operation hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10); as well as MEC construction support operations (AHA-11). Heavy equipment will be used to move materials and perform earthwork activities. Ground personnel will at times be working in the general vicinity of equipment operation. Heavy equipment will be inspected daily and documented. Ground personnel will position themselves out of the swing radius of operating heavy equipment whenever possible. Personnel will not be allowed to walk underneath buckets. Ground personnel will wear American National Standards Institute (ANSI) Class 2 high-visibility safety vests and be required to maintain visual contact with equipment operators. Verbal and hand signals will be used while operating and working near or around mobile heavy equipment. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. The hand signal of a “closed fist” will be used by ground personnel to signal to the equipment operator to stop equipment operation. Ground personnel will “point to themselves” and then “point toward the operator” to indicate that they want to approach the heavy equipment operator to communicate verbally. The equipment operator will use a “thumbs up” hand signal to indicate that it is authorized for the ground personnel to approach the heavy equipment. Ground personnel will position themselves outside of the pathway and swing radius of heavy equipment during operation. Where possible, ground personnel will position themselves on the side of an excavator where the operator vision of them is not blocked by the excavator arm. Heavy equipment operators will check in front, at the sides, and behind to make sure personnel are clear prior to equipment movement. Heavy equipment will be equipped with audible alarms (backup alarm and horn) and visual signals (warning lights) to alert ground personnel of equipment operation and movement. Training will be provided to site personnel during the site safety orientation briefing and daily safety meetings on heavy equipment hazards, communication procedures, and applicable heavy equipment operation procedures.

Vehicle and Equipment Traffic: Vehicle and equipment traffic hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10); as well as MEC construction support operations (AHA-11). Use of traffic signs, barricades, flashers, delineators, traffic cones, caution tape, and/or flagmen will be used as needed. Concurrent operation of heavy equipment and vehicles and the presence of ground personnel will occur. Traffic patterns will be established at the site for truck traffic and reviewed during safety meetings. Personnel will wear ANSI Class 2 high-visibility safety vests with reflective striping when working near mobile equipment and traffic areas. Spotters will be used for backing of vehicles into tight work areas.

Material Handling: Material handling hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and

Site Restoration and Demobilization (AHA-10) and MEC operations (AHA-11; AHA-12; and AHA-13). Material handling involving lifting and carrying of materials will be required. Personnel will review proper lifting techniques during safety meetings. Personnel will be trained in safe lifting procedures, including: size up the load first; get help if the load is bulky, heavy, or of unwieldy length; be sure of footing; lift with your legs while keeping your back straight; keep your balance; do not twist under strain or jerk the load; and keep the load close to your body.

Tools, Machinery, and Equipment Use: Tools, machinery, and equipment use hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10) and MEC operations (AHA-11; AHA-12; and AHA-13). Hand and power tools will be used. Tools will be used according to design. Tools and equipment will be inspected daily or before each use for defects. Defective or unsafe equipment will be tagged as defective until repaired or otherwise made acceptable. Power tools requiring electrical cords will use ground fault circuit interrupters (GFCIs).

Electrical Equipment: Electrical hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10). Generators/batteries will be used to provide electrical power onsite. GFCIs will be used and electrical extension cords inspected should portable electrical equipment be needed. Electrical power tools and electrical extension cords will be checked to make sure that they have ground plugs.

Noise Exposure: Noise exposure hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10); MEC disposal activities (AHA-13). Noise exposure above 85 Decibels on the A-weighted scale (dBA) is expected when working near or operating machinery and equipment (e.g., heavy equipment, generators, and compressors). Noise exposures in excess of 85 dBA are assumed to be present whenever voices must be raised to be heard in normal conversation at 3 feet apart and also whenever working in the immediate areas of operating generators, compressors, and similar equipment. Earplugs will be used for worker protection. Ear plugs to be used are MOLDEX Spark Plugs™ or similar, that have a noise reduction rating (NRR) of 33.

Heat Stress: Heat stress hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10); as well as MEC operations (AHA-11; AHA-12; and AHA-13). Heat stress conditions will be present due to elevated ambient temperatures, moderate to heavy workloads, and impermeable protective clothing use. Workers shall observe each other and themselves for development of heat stress symptoms. Personnel will be encouraged to drink generous amounts of water and electrolyte replacement fluids (even if not thirsty) to prevent dehydration. Adequate shelter will be provided to protect personnel from direct sun exposure. Sufficient breaks will be provided so that

personnel can remove protective clothing and cool down. Work/rest schedules will be adjusted as required to avoid heat stress.

Drum Handling: Drum handling hazards will be present during the following work activities Mobilization and Site Preparation (AHA-01); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Heavy Equipment Decontamination (AHA-08); and Waste Transportation and Disposal (AHA-09); Personnel will be made aware of drum handling hazards and safe work practices during daily safety meetings. Drum dollies, forklifts, and/or heavy equipment are preferred instead of manual movement of drums. Inspect drum condition and check for secure closure (i.e., drum ring/bolt, bungs) before moving. Survey the path of movement. Look for sloped ground, uneven surfaces, rocks, and soft ground (can use plywood sheet on the ground for drum movement over soft ground). Clear the pathway of debris, materials and equipment. Wear gloves to avoid cuts on sharp edges and to obtain a good grip. Check the weight of the drum and if safely manageable: place the body close to the drum; have one foot close to the base of the drum and one foot set back slightly; grasp the top of the drum on the near and opposite side; use a forward/backward rocking motion and use momentum to move the drum weight onto the near side bottom rim of the drum; keep the drum balanced on the near side bottom rim at a 35- to 45-degree angle; move the drum slowly maintaining the drum balance on the near side bottom rim without crossing over the feet or hands; watch for nearby objects (i.e., walls, drums) that may crush fingers before setting the drum down. Personnel will be trained in the use of material handling equipment, and procedures for safe handling of drums.

Power Saw Operation: Power saw hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Clearing and Grubbing (AHA-03); Soil Excavation (AHA-05); and Site Restoration and Demobilization (AHA-10). A chain saw will be used to cut off tree branches. A reciprocating saw or cut-off saw may be needed. Safety procedures will be used when operating reciprocating saws, chop saws, or similar equipment. Power saw operators will wear PPE to include eye, ear, hand, foot, and leg protective equipment. Power saw operators will hold the saw with both hands during cutting operations. Power saws are not allowed to be used to cut above the operator's shoulder height. Power saws must not be fueled while running, while hot, or near an open flame. Power saws must not be started within 10 feet of a fuel container. Gasoline and mixed gas fuels for power saws will be stored in OSHA-approved metal cans with self-closing lids and flame arrestor.

Pressure Washer Operation: Pressure washer operation may be required during the following work activities: Heavy Equipment Decontamination (AHA-08); and Site Restoration and Demobilization (AHA-10). The use of pressure washer equipment requires; only trained and experienced personnel will operate pressure-washing equipment. All electrical equipment will be shut off and locked out/tagged out before application of water in affected work areas. Pressure washing equipment operators will wear protective boots, protective clothing, hearing protection, face shields, goggles and/or safety glasses and other appropriate PPE. Metatarsal foot guards will be used when using high-pressure water (greater than 1,200 pounds per square inch [psi]). A fire extinguisher will be maintained on, or near, each operating pressure washer unit.

Inclement Weather and Adverse Environmental Conditions: Inclement weather and adverse environmental condition hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10) and MEC operations (AHA-11; AHA-12; and AHA-13). Heavy rain, lightning, and strong winds could occur during outside work operations. Provisions will be made to shut down outdoor operations should this occur. Presence of heavy rain or lightning requires stoppage of affected work activities where it can create safety hazards due to limited visibility, wet work

surfaces, slippery equipment controls, or increased hazard of electrocution. Work activities at elevated work locations require stoppage of use of equipment whose safe operation can be affected by high winds. Emergency procedures are established in this plan for response to inclement weather. MEC operations may not be performed when an electrical storm is within 10 miles. A weather monitor will be used on site to detect if a storm approaches within 10 miles of the site. All MEC operations will stop and will not re-start until the electrical storm has passed beyond 10 miles from the site.

Miscellaneous Physical Hazards: Miscellaneous physical hazards will be present during the following work activities Mobilization and Site Preparation (AHA-01); Land Surveying (AHA-02); Clearing and Grubbing (AHA-03); Sampling (AHA-04); Soil Excavation (AHA-05); Soil Stabilization (AHA-06); Grade Soil (AHA-07), Heavy Equipment Decontamination (AHA-08); Waste Transportation and Disposal (AHA-09); and Site Restoration and Demobilization (AHA-10); as well as MEC operations (AHA-11; AHA-12; and AHA-13). General safety hazards will be present during all project tasks. Poor housekeeping, uneven or slippery walking surfaces, and other slip, trip, and fall hazards, poor illumination, and overhead obstructions are primary hazards. General safety information will be communicated during safety meetings to review these hazards and safety precautions.

2.4 BIOLOGICAL HAZARDS

The primary biological hazards that may be encountered during site work are reviewed below.

Poisonous Plants: Common poisonous plants of Puerto Rico include: Apple of Sodom, Black-Eyed Susan, Castor Bean Plant, Coral Plant, Crown Flower, Jimson Weed, Oleander, Pencil Plant, Physic Nut, Poinsettia, Star-of-Bethlehem, and Yellow Oleander. Be familiar with the appearance of these plants and avoid contact. Contact local base environmental authorities for further information).

Poisonous Spiders: Poisonous spiders, such as the black widow spider, may be encountered during site work. Spiders are usually found in dark, cool, protected areas and such areas should be inspected before placing hands or feet in these areas. Spider bite first-aid procedures are: wash wound; apply a cold pack; and get medical care.

Rodents: Rodents include rats, mice, mongooses, and other related mammals and are characterized by gnawing and nibbling traits. Rodents can act as a vector for many diseases that may be transmitted directly or through other vectors, such as fleas or ticks. Precautionary measures are: avoid and/or be cautious when working near rodent habitats (wood piles, inside sheds).

Scorpions and Centipedes: Scorpions and centipedes may be encountered during site work. Scorpions are most active at night and live under rocks, logs, bark of certain trees, and often seek shelter in sleeping bags, boots, and clothing left out overnight. Scorpions are non-aggressive and sting only if disturbed. Poisonous scorpion precautions include: keep alert when moving rocks, wood, and debris and check areas before placing hands by faucet or other water source. Scorpion bite first aid procedures are to remain motionless, wash wound, apply cold pack, and get medical care.

Insects: Ant bites and bee, wasp, and hornet stings can be deadly to those who are hypersensitive. Anaphylactic shock can occur to sensitized individuals upon repeated stinging. Signs and symptoms of envenomation are usually local pain, redness, itching, and swelling. Sensitive individuals may have more serious symptoms such as welts, itching palms and feet, headache, nausea, vomiting, labored breathing, and in severe cases, respiratory paralysis or heart failure. Individuals who are hypersensitive should carry a kit containing an antihistamine and epinephrine. Mosquitoes can act as a vector for many diseases. The best protection from mosquito-borne diseases includes wearing long-sleeved shirts and pants and applying a mosquito repellent containing 20 percent to 30 percent DEET (n,n-diethyl-m-toluamide) when outdoors for any prolonged time.

2.5 RADIOLOGICAL HAZARDS

Radiological hazards are not expected for site work.

2.6 ORDNANCE AND EXPLOSIVES HAZARDS

Ordnance and explosive materials are not expected for site work. However, UXO support will be present onsite to respond in the event MEC is encountered during site operations. If MEC is encountered, the UXO Technicians will inspect it to determine if it is Material Documented as an Explosive Hazard (MDEH) or Material Documented As Safe (MDAS). USA will perform a blow in place (BIP) disposal operation on MPEH. MDAS will be inspected by two qualified UXO Technicians and certified as MDAS. It will be containerized and at the end of the project will be sent to a qualified recycler.

2.7 DUST CONTROL

The primary activity that will generate airborne dust is expected to be the excavation and handling of contaminated soil. Dust will be primarily controlled at the work site using water spray application. Airborne dust monitoring will be conducted during the excavation process. Airborne dust monitoring will be conducted to document a negative exposure assessment.

2.8 ACTIVITY HAZARD ANALYSES

AHAs are prepared before beginning each major phase of work operations. The AHA reviews hazards and control measures for primary site tasks. The AHA defines the activities to be performed and identifies the sequence of work, specific hazards anticipated, and control measures to be implemented to eliminate or reduce hazards to an acceptable level. Work does not proceed on that phase of work until the AHA has been accepted and the AHA has been reviewed with personnel involved with the activity. The AHA is reviewed and modified to address changing site conditions or operations. AHA modification occurs with the concurrence of the SHM, PM, SS, SSHO, and NTR.

Table 2-3 below lists AHAs applicable to this SSHP. AHAs are provided in Attachment 6.

Table 2-3 AHAs Applicable to This SSHP

#	AHA Title
AHA-01	Mobilization and Site Preparation
AHA-02	Land Surveying
AHA-03	Clearing and Grubbing
AHA-04	Sampling
AHA-05	Soil Excavation
AHA-06	Soil Stabilization
AHA-07	Grade Soil
AHA-08	Heavy Equipment Decontamination
AHA-09	Waste Transportation and Disposal
AHA-10	Site Restoration and Demobilization
AHA-11	MEC Construction Support
AHA-12	MPPEH Inspection and Certification
AHA-13	MEC Disposal

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3. STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

Information of key project personnel is the same as the original SSHP.

3.1 KEY PROJECT PERSONNEL

Key project personnel are identified in the project Emergency Contact List (see Original SSHP Attachment 2). Attachment 3 contains contact information of known subcontractors. **Table 3-1** below identifies key project personnel and provides their telephone contact information.

Table 3-1 Project Personnel and Contact Information

Position	Name	Telephone Number
CAPE		
Deputy Project Manager (PM)	Brian Mattingly	Office: (513) 846-0826
USA Corporate Health and Safety Manager	Cheryl M. Riordan, CSP	Office: (757) 689-4737 Mobile: (813) 426-2112
Safety and Health Manager (SHM)	Ken Beatty, Certified Safety Professional (CSP)	Office: (678) 287-1355 Mobile: (678) 480-5622
Site Safety and Health Officer (SSHO)	Robert Hernandez	Office: (210) 377-2008-- Mobile: —(210) 452-8929
Alternate SSHO	Golnaz Ashouri	Office: (678) 287-1356-- Mobile: (404) 388-1003--
Site Manager/Quality Control Manager (SM/QCM)	Golnaz Ashouri	Office: (678) 287-1356-- Mobile: (404) 388-1003--
NAVAL FACILITIES ENGINEERING COMMAND – SOUTHEAST		
Remedial Project Manager (RPM)	Stacin Martin	(757) 322-4780
Activity Point-of-Contact (POC)	Pedro Ruiz	(757) 286-9139

* - The SSHO assignment may change based on personnel availability at the time of mobilization. If the SSHO assignment changes, the replacement SSHO will possess all required training and experience.

3.2 PROJECT TEAM PERSONNEL S&H RESPONSIBILITIES

3.3 SITE VISITORS

Any official visitor who seeks entry into an EZ or CRZ shall present the SSHO with: proof of S&H training in compliance with OSHA HAZWOPER requirements; medical surveillance examination clearance, and respirator fit testing certification (if applicable). The SSHO shall maintain a Visitors Log at the site. If qualifications are met, authorized site visitors may enter the site upon meeting the following conditions:

- Sign in on the site Visitor Log upon arrival at the site;
- Receive site hazard and safety instructions from the SSHO;
- Review and comply with the essential elements of the SSHP and applicable SOPs;
- All personnel entering the site, including visitors, shall wear the proper PPE; and
- Visitors will be escorted at all times while on project site.

3.4 SUBCONTRACTORS

Subcontractors will be used to provide various services on this project (i.e., waste transportation and disposal). Subcontractors will be required to prepare and submit AHAs or collaborate with the USA Team in the preparation of AHAs for the tasks they will perform.

All site personnel and subcontractors will be required to adhere to the procedures set forth in this SSHP. The SSQCO and SSHO will be responsible for overall management and coordination of site personnel and subcontractors and ensuring they perform all aspects of the work in accordance with the Work Plan, the PQCP, and this SSHP and are aware of company and site policies and procedures and abide by them to provide a safe working environment.

Subcontractor	Address/ Contact Name	Responsibility
Waste Management of Puerto Rico Inc. "El Coqui Landfill"	Carlos Villanueva (939) 969-4878 cvillanueva@wM.com	Waste Disposal
Fraticelli Trucking Company, Inc.	Eduardo Fraticelli (787) 836-1610	Transportation
Caribe Hydroblasting, Inc. (CHED)	Raul Alacala (787) 836-1110 ralcala@chedcaribe.com	Emergency Spill Response

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4. TRAINING

Training requirements are reviewed in this section of the SSHP.

Copies of S&H training certificates will be reviewed and maintained by the SSHO. Personnel will not be allowed to perform fieldwork until such documentation has been presented to the SSHO and the SSHO has determined this documentation to be complete and sufficient.

Certifications and designations (first-aid responders, Competent Person [CPs]) for project personnel and a resume for the SSHO are provided in Attachment 4.

4.1 TRAINING REQUIREMENTS

Table 4-1 Training Requirements

Training Description	Personnel
Initial Safety Briefing	Site Personnel
Daily Safety Briefing	Site Personnel
Monthly Supervisor Safety Meeting	Site Supervisors
Visitor Safety Indoctrination Briefing	Site Visitors
30-Hour OSHA Construction S&H Training	SSHO
40-Hour HAZWOPER Initial Training and current refresher	Site Personnel
HAZWOPER Supervisor Training	Site Supervisors (SSHO; Site Manager; PM)
First-Aid/CPR Training	Minimum of 2 trained first-aid responders (SSHO plus 1)
Bloodborne Pathogen (BBP) Training	First-aid responders
Excavation Competent Person Training	SSHO/QCM
Heavy Equipment Operator Training	Heavy Equipment Operators
Lead Training	Site Personnel (workers handling lead-contaminated soil)
Lead Awareness Training	Site Personnel working in the vicinity of lead-contaminated soil operations
Emergency Response Plan Training	Site Personnel

4.2 SAFETY INDOCTRINATION BRIEFING

New workers must receive a site orientation briefing and review the SSHP before start of work. Personnel will sign a form documenting that they have reviewed the plan, understand the SSHP requirements, and agree to follow the plan.

Before start of work, the SSHO will provide a site orientation briefing to workers related to project operations and SSHP requirements. The briefing will include review of (as applicable): provisions of the SSHP; facility background and scope of work; key personnel and S&H responsibilities; site hazards anticipated; exposure monitoring program; site control procedures; PPE requirements; procedures for reporting unsafe conditions or unsafe work practices; procedures for reporting an injury/illness; emergency procedures, including warning signals and evacuation procedures; location/route to the emergency hospital; training requirements; medical surveillance requirements; and recordkeeping procedures.

4.3 HAZARD COMMUNICATION TRAINING

The SSHO will train each site worker on the location of MSDSs/SDSs, storage/location areas of hazardous substances, and will review the MSDS/SHSs for specific S&H protection hazards, procedures, and protective measures. Training will include acceptable containers and labeling requirements for hazardous substances should any hazardous substance be transferred from its original container to another container or the label on the container becomes damaged or ineligible.

4.4 SAFETY MEETINGS

Daily safety meetings will be conducted at the beginning of each work shift by the SM or SSHO to review, with the work crew, past activities, plan for new or changed operations, review pertinent aspects of appropriate AHAs (by trade), establish safe working procedures for anticipated hazards, and provide pertinent S&H training and motivation. Attendance by all project personnel is mandatory. Meetings will be documented, including the date, subjects discussed, name of individual who conducted the meeting, and attendees. Those in attendance will be required to sign the Tailgate Safety Meeting or equivalent form. Documentation will be maintained and copies furnished to the designated authority on request.

4.5 MONTHLY SUPERVISOR SAFETY MEETINGS

Supervisor safety meetings will be held at least once a month for all supervisors on the project location. The SHM and/or SSHO will conduct the safety meeting and will discuss safety-related issues directed toward supervisor responsibilities. Meetings will be documented, and attending personnel will sign a Safety Meeting Attendance Roster. Safety meeting forms will be maintained by the SSHO, and copies will be furnished to the NTR upon request.

4.6 HAZWOPER TRAINING

Personnel involved in hazardous waste activities at the site must have completed hazardous waste operations training as required by the OSHA HAZWOPER standard. Certificates of HAZWOPER training will be maintained by the SSHO at the site. Copies of current training certification statements will be submitted before initial entry onto the work site.

Required HAZWOPER training includes: 40 hours of initial training and 3 days of supervised field experience (workers and supervisors); 8 hours of additional specialized manager/supervisor training (supervisors); 8 hours of refresher training annually (workers and supervisors).

4.7 FIRST-AID/CPR TRAINING

Selected site personnel will have current certification in first-aid and CPR training to assist in initial handling of emergency medical incidents. At least two persons, who are currently certified in first aid and CPR by the American Red Cross or other approved agency, must be on site at all times during site operations where site work is not located within 5 minutes of an emergency medical facility.

4.8 BLOODBORNE PATHOGEN TRAINING

Designated first-aid responders are required to complete bloodborne pathogen (BBP) training as per the OSHA BBP regulation (29 CFR 1910.1030). BBP training is provided to personnel who have potential exposure to blood or other potentially infections materials.

4.9 EXCAVATION COMPETENT PERSON TRAINING

Excavation safety training is required for persons that are designated to perform as an Excavation Competent Person for trenching and excavation operations that involve entry of personnel into trenches four feet or more or excavations five feet or more in depth. Competent persons must be knowledgeable in the OSHA "Excavation" standard (29 CFR 1926 Subpart P) and requirements for safe performance of excavation operations. Excavation safety training involves review of: OSHA excavation standards and company procedures; excavation safety hazards; soil analysis methods and classifications; protective systems for excavation safety; and duties, authority, and responsibilities of the Competent Person.

4.10 HEAVY EQUIPMENT OPERATOR TRAINING

Personnel who will operate heavy equipment shall have experience and knowledge in the safe operation of the heavy equipment to be operated. The heavy equipment operator shall be familiar with the equipment manufacturer's operating procedures and safe practices for each piece of equipment to be used.

4.11 LEAD TRAINING

Site personnel who complete lead-related construction work at the site are required to have completed lead hazard communication and respiratory protection training. Inorganic lead employee information and training includes review of: content of the OSHA standard and its appendices; nature of operations that could result in lead exposure at or above the action level; purpose, proper selection, fitting, use, and limitations of respirators; purpose and description of medical surveillance and medical removal protection programs; engineering controls and safe work practices; contents of any compliance plan in effect; instructions regarding chelating agent use; and employee right of access to records. Lead awareness training will be provided to personnel working in the vicinity of lead hazard operations.

4.12 EMERGENCY RESPONSE PLAN TRAINING

Emergency response plan training is conducted by the SSHO during initial site safety orientation briefings and elements are periodically reviewed during daily safety meetings. Emergency response plan training reviews: SSHP emergency response plan information that includes escape procedures and routes, critical plant operations, employee accounting following an emergency evacuation, rescue and medical duties, means of reporting emergencies, persons to be contacted for information or clarification, and off-site emergency support services and agreements. The SSHO shall conduct an exercise of the Emergency Response Plan and complete a critique of the exercise.

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5. PERSONAL PROTECTIVE EQUIPMENT

PPE requirements are reviewed in this section of the SSHP.

PPE will be required for certain field operations based on the potential for contaminant exposures. The SSHO and SHM will establish appropriate levels of protection for each work activity based on review of historical site information, existing contaminant data, and evaluation of the potential for exposure. The SSHO and SHM will establish action levels for upgrade or downgrade in the initial minimum levels of protection.

5.1 LEVELS OF PROTECTION

PPE requirements will be referenced to the U.S. Environmental Protection Agency (EPA) levels of protection system that consists of four levels of protection (A-D) as described below:

Level A Protection: Level A protection is worn when the highest level of respiratory, eye, and skin protection is needed. Level A protection is used for initial entry into certain confined spaces, entry into areas with extensive skin and respiratory hazards, and entry into areas where the hazard of significant exposure to unknown contaminant concentrations exists.

Level B Protection: Level B protection is worn when the highest level of respiratory and eye protection is needed, but a lesser level of skin protection is needed than for Level A. Level B protection is used for initial entry into certain confined spaces, entry into areas with significant skin and respiratory hazards, and entry into areas where the hazard of significant exposure to unknown contaminant concentrations exists.

Level C Protection: Level C protection is worn when a similar level of skin protection as Level B is needed, but a lower level of respiratory protection is needed. Level C protection is used when limited skin hazards exist and concentrations of contaminants are within the protection factor of an APR.

Level D Protection: Level D protection is worn when minimal protection is needed and activities are not likely to involve direct contact with contaminated materials. Modified Level D protection is used when some skin protection is desired for protection against accidental skin contact with contaminants.

5.2 PPE REQUIREMENTS

It is anticipated that Level D and Modified Level D protection use will be required for project activities. Provisions will be established for upgrade to Level C protection if air monitoring action levels are exceeded. Level A and B work is not expected.

The primary basis for the level of protection selection is as follows: Level C protection is used for work where there is potential for low-level exposure to air contaminants above exposure monitoring plan action levels and limited direct contact with contaminants. Modified Level D protection is used for work where there is no potential for significant air contaminant exposure, and protective clothing is used for protection from limited direct contact with contaminants. Level D protection is used for work where there is no significant potential for contaminant exposure.

5.3 LEVELS OF PROTECTION FOR MAJOR WORK TASKS

Levels of protection to be used for the major project activities are reviewed below:

5.3.1 Mobilization and Site Preparation

Level D protection will be used during mobilization and site preparation work tasks (site reconnaissance, laydown area setup, work zone delineation, utility locating and mark-out, erosion and sediment controls).

5.3.2 Land Surveying

Level D protection will be used for this activity (contractor land survey work including the use of hand tools).

5.3.3 Clearing and Grubbing

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where contact with lead-contaminated soil may occur. Level D protection will be used where there will not be any contact with contaminants. Upgrade to Level C protection will occur if airborne dust or lead exposures exceed action levels.

5.3.4 Sampling

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where contact with lead-contaminated soil may occur. Level D protection will be used where there will not be any contact with contaminants.

5.3.5 Soil Excavation

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where contact with lead-contaminated soil may occur. Level D protection will be used where there will not be any contact with contaminants. Upgrade to Level C protection will occur if airborne dust or lead exposures exceed action levels.

5.3.6 Soil Stabilization

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where contact with lead-contaminated soil may occur (soil mixing). Level D protection will be used where there will not be any contact with contaminants. Upgrade to Level C protection will occur if airborne dust or lead exposures exceed action levels.

5.3.7 Grade Soil

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where contact with contaminated soil may occur (grading). Level D protection will be used where there will not be any contact with contaminants. Upgrade to Level C protection will occur if airborne dust or contaminant exposures exceed action levels.

5.3.8 Heavy Equipment Decontamination

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where there are no significant airborne contaminant concentrations but the potential for direct contact with contaminants is present. Level D protection will be used for activities that do not involve contaminant exposure. Upgrade to Level C protection will occur if airborne particulate exposures exceed action levels.

5.3.9 Waste Transportation and Disposal

Modified Level D and Level D protection will be used for this activity. Modified Level D protection will be used where contact with contaminants may occur. Level D protection will be used where there will not be any contact with contaminants.

5.3.10 Site Restoration and Demobilization

Modified Level D and Level D protection will be used for site restoration and demobilization.

5.3.11 MEC Construction Support Activities

During MEC Construction Support activities, the UXO Technicians will don the same level of PPE as whatever operation they are supporting requires.

5.4 LEVELS OF PROTECTION PPE DESCRIPTION

5.4.1 Level C Protection

Level C protection consists of:

- APR full-face (protection factor of 50) or half-face (protection factor of 10) with appropriate cartridge/filter (organic vapor and N95 if asphalt fume exposure; P100 if particulate exposure)
- Disposable coveralls (Kleenguard® or Tyvek® for dust exposure; polyethylene-coated Tyvek® for incidental splash protection; PVC for liquid contact protection)
- Boots, steel-toed/shank, chemical-resistant (PVC or equivalent) or steel-toed work boots (leather) with boot covers (PVC or latex). UXO Technicians may use composite toe safety boots due to magnetometer use.
- Gloves, inner, chemical-resistant (surgical nitrile or latex) and outer gloves, chemical-resistant (nitrile; PVC or neoprene)
- Hard hat; safety glasses with side shields or goggles; ear plugs or ear muffs (if noise levels more than 85 dBA); ANSI Class 2 high-visibility safety vest with reflective striping; and two-way radio communication (optional)

5.4.2 Modified Level D Protection

Modified Level D protection consists of:

- Disposable coveralls (Kleenguard® or Tyvek® for dust exposure; polyethylene-coated Tyvek® for incidental splash protection; PVC for liquid contact protection)
- Boots, steel-toed/shank, chemical-resistant (PVC or equivalent) or steel-toed work boots (leather) with boot covers (PVC or latex). UXO Technicians may use composite toe safety boots due to magnetometer use.
- Gloves, inner, chemical-resistant (surgical nitrile or latex) and outer gloves, chemical-resistant (nitrile; PVC or neoprene)
- Hard hat; safety glasses with side shields or goggles; face shield (polycarbonate for pressure washing); ear plugs or ear muffs (if noise levels more than 85 dBA); ANSI Class 2 high-visibility safety vest with reflective striping; and two-way radio communication (optional)

5.4.3 Level D Protection

Level D protection consists of:

- Coveralls or standard work clothing
- Steel-toed work boots (leather). UXO Technicians may use composite toe safety boots due to magnetometer use.
- Hard hat; safety glasses with side shields or goggles; face shield (polycarbonate for pressure washing); work gloves (leather); ear plugs or ear muffs (if noise levels more than 85 dBA); ANSI Class 2 high-visibility safety vest with reflective striping; and two-way radio communication (optional)

5.5 RESPIRATORY PROTECTION

The SSHO is responsible for implementing the respiratory protection program at the site. The SSHO is responsible for ensuring that workers have had required medical examinations, respirator training, and respirator fit testing current within the past year. SSHO respiratory protection program duties include:

- Ensure workers complete medical exams and are approved for respirator use;
- Arrange for and/or conduct respirator training;
- Conduct and document respirator fit tests;
- Ensure the availability of appropriate respirators and supplies;
- Review tasks requiring the use of respiratory protection;
- Monitor work areas and operations continually to identify respiratory hazards;
- Monitor and enforce the proper use of respirators;
- Ensure that respirators are properly cleaned, maintained, and stored; and
- Maintain respirator training and fit testing records.

6. MEDICAL SURVEILLANCE

Medical surveillance requirements are reviewed in this section of the SSHP.

Medical surveillance requirements exist for site personnel who will be entering site EZs. Required medical qualification documentation consists of a written physician opinion regarding any detected medical conditions that may limit work hazardous waste remediation activities and an opinion regarding protective clothing and respirator use. Copies of medical surveillance examination reports for site personnel will be reviewed and maintained by the SSHO and will be made available to the NTR as required.

6.1 MEDICAL EXAMINATIONS AND REPORTS

Medical examinations for field personnel are completed before job assignment and annually thereafter. An occupational medicine Board-Certified physician will perform the physical or directly supervise the physical.

Medical examination reports for personnel are presented in the form of work status medical reports. These reports indicate any detected medical conditions that would increase an individual's risk of material health impairment from occupational exposure or if the individual has limitations in the use of PPE such as protective clothing or respirator use. Copies of medical examination reports for site personnel will be maintained by the SSHO and will be provided to the NTR as required.

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7. EXPOSURE MONITORING/ AIR SAMPLING PROGRAM

Exposure monitoring and air sampling program requirements are reviewed in this section of the SSHP.

Air monitoring will be necessary to determine personnel exposures to chemical contaminants and/or physical agents during various project activities. The SSHO or designee will be responsible for completing air monitoring activities during field operations where there is potential exposure to combustible gases, oxygen deficiency, and/or airborne contaminants above OSHA 8-hour TWA and 15-minute STEL PELs or ACGIH TLVs. A description of the plan for air monitoring to be implemented during the project is provided in this section of the SSHP.

7.1 AIR CONTAMINANTS

Air contaminants that may potentially be encountered during project fieldwork operations are lead-containing dust from excavation activities; liquid mist or vapor from tack coat application; and asphalt vapors from paving operations

7.2 AIR MONITORING PLAN

Air monitoring will be conducted during the project scope of work. The primary activity that will generate airborne dust is expected to be the handling of lead-contaminated soil. Airborne dust monitoring will be conducted during the soil handling process. Contaminant concentrations in soil are low and the likelihood of significant airborne contaminant exposure is low. Airborne dust and lead monitoring will be conducted to document a negative exposure assessment.

The SSHO or designee completes air monitoring. Should action level concentrations be exceeded, response actions will be initiated to implement engineering controls, safe work practices, upgrade or downgrade in PPE, work stoppage, emergency evacuation, and notification and evaluation by the PM and SSHO. The SSHO is responsible for maintaining copies of applicable monitoring records at the site for the duration of the project. The SSHO notifies site personnel of air monitoring results through correspondence or posting of information.

7.2.1 Airborne Dust Monitoring

Airborne dust monitoring is conducted to measure potential exposures to air contaminants during soil excavation and handling. An equivalent airborne dust action level can be calculated that represents the predicted maximum, non-volatile contaminant airborne dust concentrations that could be encountered. Airborne dust action levels are based on the cumulative total of the highest soil sample concentrations of non-volatile contaminant obtained during site assessment soil sampling. Airborne dust concentrations exceeding the action level trigger use of additional dust control measures. The action level is also used as an upgrade concentration for respirator use by workers.

Airborne dust monitoring will be conducted using an MIE PdR-1000 aerosol monitor (or equivalent) during contaminated soil handling. This direct-reading dust monitor is capable of measuring dust with a particle size of 0.1 to 10 micrometer (µm) over a range of 0.01 to 100 mg/m^3. A Z-bag unit is used for zeroing the instrument under field conditions IAW manufacturer instructions.

Table 7-1 Air Monitoring Plan

Method	Tasks / Frequency	Action Levels / Action
Airborne Dust		
MIE PdR-1000 aerosol monitor, or equivalent	TASKS: During lead-contaminated soil handling. FREQUENCY: Periodic monitoring in breathing zone of workers during lead-contaminated soil handling.	ACTION LEVEL: Airborne dust concentrations exceed 0.21 mg/m^3. ACTION: Increase dust control measures. Contact the SSHO to evaluate. Use Level C protection if directed by the SSHO.
Lead		
Personal pump; 37-mm diameter, 0.8-µm pore size, mixed cellulose ester filter. Lab analysis by NIOSH 7082.	TASKS: During lead-contaminated soil handling. FREQUENCY: Periodic monitoring in breathing zone of workers during lead-contaminated soil handling.	ACTION LEVEL: Lead concentrations are greater than, or equal to, the OSHA action level of 30 µg/m^3 and less than 500 µg/m^3 (ten times the OSHA PEL of 50 µg/m^3). ACTION: Use half-face APR. SSHO to monitor for compliance with OSHA lead regulations ACTON LEVEL: Lead concentrations are greater than, or equal to, 500 µg/m^3 (ten times the PEL and less than 2,500 µg/m^3 (50 times the PEL). ACTION: Use full face APR ACTION LEVEL: Lead concentrations are greater than 2,500 µg/m^3 (greater than 50 times PEL). ACTION: Stop work. Contact the SSHO to evaluate.

LEGEND:

µm:	micrometer
µg/m3:	micrograms per cubic meter
mg/m3:	milligrams per cubic meter
mm:	millimeter
NIOSH:	National Institute for Occupational Safety and Health
APR:	air-purifying respirator
PEL:	OSHA 8-hour time-weighted average permissible exposure limit

7.2.2 Lead Worker Exposure Monitoring

Monitoring during project operations are completed by the SSHO, or designee. Exposure monitoring results are compared against the OSHA action level of 30 µg/m^3 for an 8-hour TWA exposure and a PEL of 50 µg/m^3 for an 8-hour TWA exposure. Monitoring is conducted on those site personnel who are expected to have exposures to lead above the action level. Personal air monitoring samples will be collected during the performance of lead-related work. Exposure monitoring representative of each work task or worst-case situation is conducted to establish a negative exposure assessment or to verify the adequacy of protection levels. Lead exposure monitoring is completed from the collection and analysis of breathing zone air samples that are representative of 8-hour TWA exposures. Eight-hour TWA monitoring consists of one or more samples that represent full-shift worker exposures. All exposures are calculated without regard to use of respiratory protection. For employee lead exposures greater than 8-hours in a work day, the TWA allowable exposure for that day is reduced according to the following formula:

Allowable employee exposure (in $\mu g/m^3$) = 400
Number of hours worked in the day

Should lead airborne concentrations exceed the action level or PEL, response actions are initiated to implement additional engineering controls, safe work practices, or upgrade in respiratory protection. Lead-related work shall be suspended if worker exposure monitoring results indicate airborne lead concentrations in excess of protection factors established for the respirators in use. Work is resumed when the appropriate level of respiratory protection is donned.

When respirators are used to limit employee exposure, exposure may be considered to be at the level provided by the protection factor of the respirator for those periods that the respirator is worn. Those periods may be averaged with exposure levels during periods when respirators are not worn to determine the employee's daily TWA exposure.

Personal sampling pumps are used to collect air samples on 37-millimeter (mm) diameter, 0.8-µm pore-size, mixed- cellulose ester filters. Air samples are collected in worker breathing zones at flow rates between 1 and 4 liters per minute (LPM) to determine 8-hour TWA exposures. A minimum of two field blank samples (or 10 percent of total samples, whichever is greater) is collected for each set of samples submitted for analysis. Air samples are analyzed at an American Industrial Hygiene Association (AIHA)-accredited laboratory by atomic absorption spectrophotometry IAW the National Institute for Occupational Safety and Health (NIOSH) 7082 Method. Air sampling pumps are calibrated before and after use (pre-/post-calibration) with an electronic bubble meter calibrator, rotometer (calibrated against a primary standard), or equivalent. The average of the pre- and post-calibration is used as a measure of the "true" flow rate. Where the pump flow rate variation is greater than 5 percent, the sampling is repeated.

7.2.3 Lead Worker Exposure Monitoring Action Level:

Airborne lead concentrations in workers breathing zone are greater than, or equal to, the OSHA action level of 30 $\mu g/m^3$ and less than 500 $\mu g/m^3$ (ten times the OSHA PEL of 50 $\mu g/m^3$ as an 8-hour TWA exposure). ACTION: Use half-face APR. SSHO to monitor for compliance with lead regulations (29 CFR 1926.62)

Airborne lead concentrations in workers breathing zone are greater than, or equal to, 500 $\mu g/m^3$ (ten times the PEL and less than 2,500 $\mu g/m^3$ (50 times the PEL). ACTION: Use full-face APR or full-face powered air-purifying respirator (PAPR)

Lead concentrations in worker breathing zone are greater than 2,500 $\mu g/m^3$ (greater than 50 times PEL). ACTION: Stop work. Contact the SSHO to evaluate.

Workers may request and use respiratory protection at levels lower than those described above.

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8. HEAT STRESS

Heat stress hazards are reviewed in this section of the SSHP. Cold stress conditions are not anticipated to be encountered during the project. Heat stress safety procedures are reviewed

Personnel must be aware of the potential for heat stress during periods of elevated ambient temperatures (70ºF or above), moderate to heavy workloads, and when impermeable or semi-permeable protective clothing is in use. Personnel will be informed about the various forms of heat stress (e.g., heat cramps, heat exhaustion, and heat stroke) and the symptoms of exposure.

Heat Cramps: Signs and symptoms of exposure are: painful spasms in muscles used during work (arms, legs, or abdomen). Treatment is to: remove to cooler area; rest lying down; and increase fluid intake.

Heat Exhaustion: Signs and symptoms of exposure are: fatigue, nausea, headache, giddiness, clammy and moist skin, pale or flushed complexion; dizziness or disorientation; may faint on standing; rapid pulse and low blood pressure; normal or low temperature. Treatment is to: remove victim from further exposure prior to starting treatment; remove to cooler area; rest lying down with head in low position; administer fluids by mouth; and seek medical attention.

Heat Stroke: Signs and symptoms of exposure are: red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; can lose consciousness or have convulsions. Heat stroke is an extremely serious medical emergency. Treatment is to: remove victim from further exposure; remove all PPE and as much personal clothing as decency permits; cool rapidly by soaking in cool, but not cold, water; call ambulance and get immediate medical attention. Initial phases of work activity will be closely monitored by the SSHO because workers may not be acclimatized to hot conditions. The SSHO will try to identify personnel who are more susceptible to heat exposure.

Workers are responsible for observing each other and themselves for development of heat stress symptoms. Personnel will be encouraged to drink generous amounts of water and electrolyte replacement fluids (even if not thirsty) to prevent dehydration. Adequate shelter will be provided to protect personnel from direct sun exposure. Sufficient breaks will be provided so personnel can remove protective clothing and cool down. Work/rest regimens will be adjusted as required to avoid heat stress.

A monitoring program for heat stress will be implemented if elevated ambient temperatures (greater than 70ºF and concurrent use of impermeable protective garments occurs. When personnel are in level D PPE, the heat stress monitoring program will commence when the temperatures reach or exceed 75ºF. The monitoring program will consist of heart rate monitoring (pulse rate) and body temperature monitoring (ear thermometer readings).

8.1 HEAT STRESS MONITORING

A monitoring program for heat stress will be implemented for work in elevated ambient temperatures. Heat stress monitoring will be conducted for site personnel when ambient temperatures exceed 75°F (70°F if site personnel are using impermeable protective clothing). Heat stress monitoring and establishment of work/rest regimens for heat stress prevention are completed using a wet-bulb globe temperature (WBGT) instrument. WBGT monitoring is completed with a WBGT monitoring instrument (i.e., QUESTemp), which is able to compute the WBGT and provide a direct reading of the temperature on the instrument readout. The WBGT values will be reviewed by the SSHO. The SSHO will evaluate the data and use professional judgment in establishing and adjusting work/rest regimens to avoid heat stress.

The ACGIH heat stress prevention guidance for establishment of work/rest regimens are based on the effective WBGT (measured WBGT plus clothing adjustment factor) and the workload metabolic rate for the work activity category being performed. Information on: outdoor WBGT calculation, clothing adjustment factors, and workload metabolic rates and recommended work/rest cycles for heat stress prevention are provided below.

WBGT Calculation: Calculation of the WBGT (where there is direct exposure to sunlight) is completed using the following equation:

$$WBGT_{out} = 0.7T_{nwb} + 0.2T_g + 0.1T_{db}$$

Where: T_{nwb} = natural wet-bulb temperature; T_g = globe temperature; T_{db} = dry-bulb (air) temperature

Clothing Adjustment Factors: If one of the clothing ensembles below is being used, then the clothing adjustment factors can be added to the environmental WBGT.

- Work Clothes (long sleeve shirt and pants): 0.0°C
- Cloth (woven material) Coveralls: 0.0°C
- Double-Layer Woven Clothing: 3.0°C (5.4 °F)
- SMS Polypropylene Coveralls: 0.5°C (0.9°F)
- Polyolefin Coveralls (i.e., Tyvek): 1.0°C (1.8°F)
- Limited-Use Vapor Barrier Coveralls: 11.0°C (19.8°F)

Table 8-1 below provides ACGIH-recommended work/rest regimens based on the effective WBGT and the workload metabolic rate for the work category being performed. The SSHO will use these guidelines and his/her professional judgment in establishing and adjusting work/rest regimens to avoid heat stress.

Table 8-1 Effective WBGT and Recommended Work/Rest Cycles

Effective WBGT	Work/Rest Cycle	Effective WBGT	Work/Rest Cycle
LIGHT WORKLOAD		**MODERATE WORKLOAD**	
31.0ºC (87.8ºF)	75-100% Work/Rest	28.0ºC (82.4ºF)	75-100% Work/Rest
31.0ºC (87.8ºF)	50-75% Work/Rest	29.0ºC (84.2ºF)	50-75% Work/Rest
32.0ºC (89.6ºF)	25-50% Work/Rest	30.0ºC (86.0ºF)	25-50% Work/Rest
32.5ºC (90.5ºF)	0-25% Work/Rest	31.5ºC (88.7ºF)	0-25% Work/Rest
HEAVY WORKLOAD		**VERY HEAVY WORKLOAD**	
--------	75-100% Work/Rest	--------	75-100% Work/Rest
27.5ºC (78ºF)	50-75% Work/Rest	--------	50-75% Work/Rest
29.0ºC (82ºF)	25-50% Work/Rest	28.0ºC (82.4ºF)	25-50% Work/Rest
30.5ºC (86ºF)	0-25% Work/Rest	30.0ºC (86.0ºF)	0-25% Work/Rest

LEGEND:

Light Workload Activities (180 kcal/hr): Sitting with light manual work with hands or hands/arms; driving; standing with some light arm work; and occasional walking.

Moderate Workload Activities (300 kcal/hr): Sustained moderate hand/arm work; moderate arm/leg work; moderate arm/trunk work; light pushing/pulling; and normal walking.

Heavy Workload Activities (415 kcal/hr): Intense arm/trunk work; carrying; shoveling; manual sawing; pushing/pulling heavy loads; and walking at a fast pace.

Very Heavy Workload Activities (520 kcal/hr): Very intense activity at fast to maximum pace.

8.2 GUIDELINES FOR LIMITING HEAT STRAIN

ACGIH has established guidelines for limiting heat strain for workers. One of the following measures may mark excessive heat strain, and an individual's exposure to heat stress should be discontinued when any of the following occur:

- Sustained (several minutes) heart rate (HR) is in excess of 180 beats per minute (bpm) minus the individual's age in years (e.g., 180 – age) for individuals with assessed normal cardiac performance;
- Body temperature (BT) is greater than 38.5°C (101.3°F) for medically selected and acclimatized personnel or greater than 38°C (100.4°F) for unselected, unacclimatized workers (Note: ACGIH cites the BT as a core temperature measurement. Body core temperature monitoring will not be conducted on this project. Ear thermometer measurements will be used instead);
- Recovery HR at one minute after a peak work effort is greater than 120 bpm; and
- There are symptoms of sudden and severe fatigue, nausea, dizziness, or lightheadedness.

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9. STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

Standard operating safety and occupational health procedures, engineering controls, and work practices are reviewed in this section of the SSHP.

9.1 PROJECT SAFETY AND HEALTH PROGRAM PROCEDURES

The SSHO shall maintain a copy of applicable safety and health references on site.

9.2 SAFETY AND HEALTH DOCUMENTATION

S&H documentation records associated with SSHP implementation will be maintained by the SSHO. S&H documentation records, as applicable, include the following: SDSs and MSDSs; S&H training documentation; medical surveillance examination documentation; respirator fit testing forms; SSHP review and safety meeting records; safety inspection reports; equipment inspection forms; confined space entry permits; hot work permits; exposure monitoring records and employee notifications; incident reporting and investigation records; and other S&H documents.

9.3 SAFETY INSPECTIONS

The SSHO will perform daily S&H inspections of the work site. Quality control personnel, as part of their quality control responsibilities, conduct and document safety observations. Project QC personnel shall note and document S&H issues in daily QC reports. Daily inspections will be documented in the SSHO logbook and included in the Daily QC Report. Weekly inspections will be documented using a Safety Inspection Report Form. Copies of safety inspections will be maintained onsite and available for review. The weekly safety inspection report will provide the basis for the Safety and Occupational Health Deficiency Tracking Log.

9.4 SITE SAFETY AND HEALTH PLAN FORMS

Completed SSHP forms are maintained onsite by the SSHO for the duration of the project. SSHP forms (see Attachment 1) that may be used during the project are indicated below:

- AHA Preparatory Phase Training Log
- Air Monitoring Log
- Calibration Log: Direct-Reading Monitoring Instrument
- Emergency Eyewash Inspection Log
- Emergency Medical Notification Form
- Equipment Decontamination Release Authorization
- Fire Extinguisher Inspection Log
- First-Aid Kit Inspection Log
- First-Aid Treatment Log
- Hazardous Substance Inventory List
- Heavy Equipment Inspection Report
- Hot Work Permit
- Incident Reporting and Investigation Procedures Posting
- Incident Report by Supervisor
- Incident Statement by Employee
- Incident Statement by Witness
- Injury and Illness Report
- Inspection Checklist: Construction Safety (R&I)
- Property Damage, Loss, and General Liability Report

- Safety and Occupational Health Deficiency Tracking List
- Safety Inspection Report
- Site Control Log
- Site Control Log for Visitors
- Site Safety and Health Plan Change Approval Form
- Site Safety and Health Plan Distribution to Subcontractor
- Site Safety and Health Plan Review
- Tailgate Safety Meeting Record
- Training Attendance Roster
- Vehicle Accident Report
- Visitor Information and Acknowledgement Form
- NAVFAC Contractor Significant Incident Report (CSIR) Form
- NAVFAC Contractor Site Safety Assessment Form

10. SITE CONTROL MEASURES

Site control requirements are reviewed in this section of the SSHP. Site control procedures are established to: restrict access to controlled areas of the worksite, identify means for site communication, and establish measures for site security.

10.1 SITE WORK ZONES

Site work zones are established based on the type of operations to be conducted in the work zone, potential for exposure to contaminants, and potential for contact with other safety hazards. The establishment of controlled work zones (i.e., EZ, CRZ, and support zone) may be required only during specific operations identified by the SSHO. Site work zone requirements are established to limit access to work areas to authorized personnel, prevent the spread of contamination from the work area, establish site communication, and site security measures. Work zone demarcation will be established through use of caution tape or other means (e.g., barricades, fencing, signs) as approved by the SSHO.

10.1.1 Exclusion Zone

The EZ is the work zone that represents the area of highest contamination at the site. The EZ will be identified by the SSHO for each work area. The level of protection used within the EZ may vary dependent upon the various work tasks to be conducted and is determined by the SSHO. The EZ may be extended to the hazardous fragmentation distance of a MEC round, should one be encountered.

10.1.2 Contamination Reduction Zone

The CRZ is the work zone that represents the transition area between the EZ and the support zone at the site. Entry to/exit from the EZ will be through a designated location in the CRZ. Upon exit from the EZ, workers will be required to pass through the CRZ before entering the support zone. Personnel decontamination will occur within the decontamination station in the CRZ.

10.1.3 Support Zone

The support zone is the work zone outside of the CRZ that represents the clean areas established at the site. The command post, medical station, equipment and supplies, and other support facilities will be located in the support zone. All breaks, lunch, and meetings will take place in the support zone. Whenever possible, support zone activities will be located upwind of the EZ to reduce the possibility of vapor and/or dust exposures.

10.1.4 Location of Site Work Zones

The EZ generally coincides with the extent of contamination/excavation. The CRZ is located between the EZ and the support zone. The CRZ comprises the personnel and equipment decontamination area.

10.2 SITE CONTROL LOG

A log of personnel visiting, entering, or working at the site will be maintained. A Site Control Log form will be completed daily. This log includes entries for the date, name, organization, and time entering and exiting the site. The Site Control Log is maintained onsite by the SSHO. All personnel are required to report and sign in with the SSHO upon arrival at the site. Personnel who wish to enter a CRZ or EZ at the site must provide to the SSHO copies of required training, medical fitness for duty, and respirator fit testing documentation before site entry is authorized.

10.3 SITE COMMUNICATIONS

Site communications are critical to allow for expedient communication of operational instructions, safety information, and emergency communications and include:

- The Site Manager and SSHO will have a mobile phone on-site at all times; and
- Emergency communication instructions are found in the emergency response plan section of the SSHP.

10.4 SITE SECURITY

Site security measures are required to prevent unauthorized access to controlled areas of the site. Site security measures include:

- Personnel are required to check-in at the project office and sign in on the Site Control Log form before entering controlled areas of the site. If a project office is not established at the site, then personnel shall check-in with the SSHO to sign in and out. Unauthorized persons are not allowed into the controlled areas of the site;
- Temporary fencing, barricades, signs, and/or caution tape will be used for delineation of controlled areas, if needed;
- Protection is required around open holes during off hours (e.g., temporary fencing, barricades with flashing lights, and signs/caution tape);
- If MEC is encountered late in the day and there is not time to have explosives delivered for a MEC disposal operation, the area must be guarded constantly to prevent access to the round prior to the disposal operation; and
- Site personnel are required to comply with facility security measures.

10.5 SITE VISITORS

Authorized site visitors may visit the site upon meeting the following conditions:

- Sign in on the site Visitor Log;
- Site visitors must be escorted at all times while in the EZ;
- Receive site hazard and safety instructions from the SSHO;
- Review and comply with the essential elements of the SSHP;
- Use their own PPE, or that provided by others, to enter regulated work areas; and
- Report observed unsafe acts and/or conditions at, or affecting, the work site.

In addition, any official visitor who seeks entry into an EZ or CRZ shall present the SSHO with: proof of S&H training in compliance with OSHA HAZWOPER requirements; medical surveillance examination clearance; and respirator fit testing certification (if applicable). The SSHO shall maintain a Site Control Log for visitors at the site.

11. PERSONAL HYGIENE AND DECONTAMINATION

Personal hygiene and decontamination requirements are reviewed in this section of the SSHP. Personnel hygiene and personnel decontamination measures will be required for site work. It is anticipated that dry decontamination measures will be used for site work.

11.1 PERSONAL HYGIENE

Food, beverages, tobacco products, or cosmetics are not allowed in contaminated areas or potentially contaminated areas. Eating, drinking, chewing gum or tobacco, and smoking are allowed only in designated areas.

Good personal hygiene and decontamination practices will be followed at all times. Site washing facilities will be provided at the job location, and personnel will be instructed to practice good personal hygiene by washing the face, hands, and forearms before eating, drinking, smoking, etc. Portable toilets will be readily available at the job location.

11.2 PERSONNEL DECONTAMINATION

The SSHO will determine the procedures to be used for personnel decontamination. It is anticipated that dry decontamination measures will be used for site work. A dry decontamination method is used when there is limited contact with contaminants (i.e., soil handling). A wet decontamination method is used when there is significant contact with contaminants due to contact with liquid contaminants, muddy surface contamination, or other heavy contamination.

General personnel decontamination requirements include:

- The SSHO must review specific decontamination procedures with personnel required to enter controlled work zones of the site and will monitor and ensure use of prescribed decontamination procedures;
- Personnel will be instructed to minimize contact with contaminants, to the extent feasible, to reduce the potential for personal or equipment contamination;
- Personnel decontamination occurs at the decontamination station established within the CRZ for each work location. Decontamination activities occur in the CRZ after working in the EZ and before entrance into the support zone; and
- Personnel must clean, remove, and place contaminated disposable protective clothing in marked containers before leaving the CRZ.

11.3 DRY DECONTAMINATION PROCEDURES

A dry decontamination method is used when there is limited contact with contaminants and when the SSHO has determined that a wet decontamination method is not necessary. The decontamination sequence should be completed as follows:

- Station 1 - Equipment Drop: Deposit used equipment on sheet plastic or in container with plastic liner;
- Station 2 - Outer Boot Covers and Outer Gloves Removal: Remove outer boot covers and outer gloves. Deposit in container with plastic liner;

- Station 3 - Boots and Outer Garment Removal: Remove boots and suit and deposit in containers with plastic liners;
- Station 4 - Respirator Face Piece and Inner Gloves Removal: Remove respirator face piece (avoid touching face with fingers) and deposit on sheet plastic or in plastic bag. Remove inner gloves; and
- Station 5 - Field Wash: Wash hands and face thoroughly.

11.4 DECONTAMINATION PROCEDURES – WET METHOD

A wet decontamination method is not expected for site work, however, will be used when there is significant contact with contaminants (i.e., contact with liquid contaminants, muddy surface contamination, other heavy contamination) or when the SSHO has determined it is necessary. The decontamination sequence should be completed as follows:

- Station 1 - Equipment Drop: Deposit used equipment on sheet plastic or in container with plastic liner;
- Station 2 - Boots and Outer Garments Wash/Rinse: Scrub outer boots, outer gloves, and suit with detergent/water solution. Rinse off with water;
- Station 3 - Outer Boot Covers and Outer Gloves Removal: Remove outer boot covers and outer gloves. Deposit in container with plastic liner;
- Station 4 - Cartridge/Canister or Mask Change-Out: Change-out APR cartridges/canister or face piece as needed. For respirator change-out and return to EZ, don new outer gloves and boot covers, tape at joints, and return to EZ. For entry into the support zone, continue decontamination sequence;
- Station 5 - Boots and Outer Garment Removal: Remove boots and suit and deposit on sheet plastic or in containers with plastic liners;
- Station 6 - Respirator Face Piece and Inner Gloves Removal: Remove respirator face piece (avoid touching face with fingers) and deposit on sheet plastic or in plastic bag. Remove inner gloves; and
- Station 7 - Field Wash

12. EQUIPMENT DECONTAMINATION

Equipment decontamination requirements are reviewed in this section of the SSHP. Equipment decontamination measures will be required for site work. It is anticipated that a combination of dry decontamination measures will be used for equipment decontamination.

12.1 EQUIPMENT DECONTAMINATION PROCEDURES

Procedures are required to prevent the spread of contamination from vehicles and equipment used in the EZ into support zone and off-site areas. Equipment will be decontaminated by procedures established by the SSHO and include:

- Vehicle and equipment use in the EZ and/or contact of vehicle and equipment tires with contaminated surfaces will be minimized to the extent possible
- Dirt will be brushed or scraped off of vehicles and heavy equipment to remove visible materials. As needed, a pressure washer will be used to decontaminate vehicle tires and equipment before moving from the CRZ offsite

Following decontamination, heavy equipment will be inspected and an Equipment Decontamination Release Authorization Form prepared by the SSHO to document decontamination before equipment are allowed to move offsite.

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13. EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES ARE REVIEWED IN THIS SECTION OF THE SSHP.

13.1 EMERGENCY RESPONSE PLAN

A written emergency response plan must be developed and implemented for HAZWOPER operations to handle anticipated emergencies prior to commencement of emergency response operations.

Elements of an emergency response plan for HAZWOPER operations include:

- Pre-emergency planning and coordination with outside parties
- Personnel roles, lines of authority, training and communication
- Emergency recognition and prevention
- Safe distances and places of refuge
- Site security and control
- Evacuation routes and procedures
- Decontamination
- Emergency medical treatment and first aid
- Emergency alerting and response procedures
- Critique of response and follow-up
- PPE and emergency equipment.

13.1.1 Pre-Emergency Planning and Coordination with Outside Parties

Pre-emergency planning will involve coordination with outside parties. Onsite emergency planning shall be integrated with offsite emergency support. The SSHO will contact the local emergency medical services (EMS) and apprise them of the location, schedule, type of work, and inventory of flammable materials to be on site. The SSHO will offer the emergency service providers with an onsite orientation to the project to review site hazards. The SSHO will document the emergency service agreements (e.g., documentation may include written agreements, memoranda for record, telephone conversation logs).

Onsite Medical Support: Trained first-aid responders will provide initial first-aid/CPR support for jobsite medical emergencies. A minimum of two first-aid/CPR-trained workers shall be present on site during field work. A list of designated first-aid responders will be included as an attachment to the SSHP. This list will be reviewed during site orientation briefings and safety meetings and posted by the first-aid station in the job trailer.

Offsite Medical Support: Support from the designated emergency hospital for serious medical emergency incidents. For minor injuries or other medical services (i.e., drug testing, medical exams); the SHM and SSHO may designate a local medical clinic to provide offsite medical support services.

Medical Consultation: The USA Team may utilize occupational physician support services. The physicians will be Board-Certified (or Board-Eligible) and provide medical director services.

Fire Incidents: A request for facility fire department support in case of a fire incident on site will be established. Onsite fire extinguishers will be used by trained personnel to extinguish small fires if it is safe to do so.

Chemical Spill Incidents: The USA Team and its subcontractors have personnel onsite that are HAZWOPER trained and will respond to chemical spills at the job site. Spill incidents will be reported as indicated by facility requirements but spill response support from outside parties is not anticipated.

Weather-Related Emergencies: The USA Team will follow facility requirements for site preparation and evacuation in case of impending weather-related emergency.

13.1.2 Personnel Roles, Lines of Authority, Training and Communication

Personnel Roles: The SSHO is the primary emergency response coordinator for all emergency events. The Site Manager, QCM, and other site supervisors will provide support to the SSHO in his efforts to resolve and emergency incident.

Lines of Authority: The SSHO is the primary emergency response coordinator for all emergency events. All site supervisors report to the SSHO in times of emergency.

Training: Before start of work, the SSHO will provide a site orientation briefing to workers related to project operations and SSHP requirements. The briefing will include review of procedures for reporting an injury/illness, emergency procedures including warning signals and evacuation procedures, location/route to the emergency hospital.

Communications: Site and emergency communication procedures include:

- Cellular telephones will be used for site and emergency communications;
- The SSHO will maintain an Emergency Contact List (see Attachment 2). The SSHO is responsible for designating an emergency hospital and determining the route to the emergency hospital before the start of field operations;
- The SSHO will ask site personnel to complete a notification form to advise the SSHO of if the individual has a medical condition that could require emergency medical assistance (e.g., hypersensitivity to bee stings); and
- The SSHO will establish emergency communications procedures before site work and will communicate this information to site personnel during site orientation briefings and safety meetings.

13.1.3 Emergency Recognition and Prevention

In the event of an emergency incident, the SSHO and Site Manager will be immediately notified. The SSHO will obtain information regarding the emergency and will respond immediately to the emergency location. The SSHO shall determine the situation and hazards involved. As needed, the SSHO will contact the SHM to assist with the hazard assessment, evaluation, and control measures needed to resolve an emergency incident.

13.1.4 Safe Distances and Places of Refuge

Places of refuge will be designated by the SSHO during the site orientation briefing and periodically during daily safety meetings. The job trailer will be the main place of refuge in an emergency incident, except in cases where toxic air contaminants may be involved and the job trailer is in proximity to and downwind of the incident location.

13.1.5 Site Security and Control

Site security measures are necessary to prevent unauthorized access to controlled areas of the site; especially in times of emergency. Site security measures include:

- Personnel are required to check-in at the project office and sign in on the Site Control Log form before entering controlled areas of the site. The Site Control Log will be used by the SSHO to account for site personnel in the event of an onsite emergency;
- Temporary fencing, barricades, signs, and/or caution tape will be used as needed to control access to an emergency location; and
- As directed by the SSHO, a guard will be posted at the entrance to the site to control and restrict site access to only those essential personnel needed in the event of an emergency incident.

13.1.6 Evacuation Routes and Procedures

Evacuation routes will be reviewed during site safety orientation briefings and periodically during daily safety meetings.

For major emergency events (e.g., large fires, gas line or electrical line breaks, etc.) an emergency evacuation alarm will be sounded. The alarm will be a single long blast on a vehicle horn or a compressed air horn.

Nonessential personnel will be evacuated from the work area until the SSHO determines that it is safe for work to resume. Personnel will evacuate to a refuge area that has been designated by the SSHO in the initial site safety orientation or tailgate safety meeting. Typically the onsite assembly area will be at the job trailer and the offsite assembly area will be at a designated area upwind and outside of the entrance point into the site. The SSHO will notify the facility emergency contact and local fire, police, and/or EMS as necessary. The SSHO and Site Manager will complete a head count to make sure that all site personnel are accounted for.

13.1.7 Decontamination

In response to an emergency event, a dry decontamination method will be use. The decontamination sequence should be completed as follows:

- Station 1 - Equipment Drop: Deposit used equipment on sheet plastic or in container with plastic liner;
- Station 2 - Outer Boot Covers and Outer Gloves Removal: Remove outer boot covers and outer gloves. Deposit in container with plastic liner;
- Station 3 - Boots and Outer Garment Removal: Remove boots and suit and deposit in containers with plastic liners;
- Station 4 - Respirator Face Piece and Inner Gloves Removal: Remove respirator face piece (avoid touching face with fingers) and deposit on sheet plastic or in plastic bag. Remove inner gloves; and
- Station 5 - Field Wash: Wash hands and face thoroughly.

13.1.8 Emergency Medical Treatment and First-Aid

First-aid Responders: First-aid responders will be present at the project location. Supervisory site personnel will have completed first-aid and cardiopulmonary resuscitation (CPR) training, and at least two persons trained in first-aid/CPR will be onsite during project activities. Designated first-aid responders are indicated on the Designated First-Aid Responder List (see Attachment 4).

Emergency Hospital and Route Information: The SSHO will select an emergency hospital and determine the route to the emergency hospital before site work. It is required that the SSHO and Site Manager drive the route prior to site work. The emergency hospital information and emergency hospital route map will be provided in the SSHP. The SSHO will post emergency hospital information in the project office and place in site vehicles.

13.1.9 Emergency Alerting and Response Procedures

Notification of Site Emergency: All site personnel are required to immediately notify the SSHO and Site Manager immediately in the event of any type of site emergency. An "Emergency Contact List" will be provided in the SSHP. The SSHO will post the Emergency Contact List in the job trailer (if applicable) and it will be placed inside site vehicles. An emergency route map will be provided in the SSHP. The SSHO will post emergency hospital information in the job trailer office and it will be placed inside site vehicles.

Response to Medical Emergency Incident: In the event of a medical emergency, the following procedures will be implemented:

- The exposed or injured person will be removed from immediate danger and first-aid and/or CPR will be administered by trained site personnel;
- Emergency medical assistance will be called and will be informed of the following: name and location of person reporting; location of accident or incident; specific directions to the emergency location, as needed; phone number from which the person is calling; number of persons needing help; what is currently being done for the victim (for life-threatening injuries, request instructions from emergency services dispatcher); name and affiliation of injured party; description of injuries; details of any chemical involved; summary of the accident, including suspected causes and time of occurrence; and temporary control measures taken to minimize further risk;
- Nonessential personnel will be evacuated from the work area until the SSHO determines that it is safe for work to resume;
- A medical emergency involving chemical exposure will require communication between the SSHO and emergency hospital personnel regarding chemicals involved; and
- The SSHO will designate an individual to accompany or follow the victim to the emergency hospital to assist with any needs that arise and to report back regarding the victim's status.

Response to Fire Incident: The SSHO will consult with the local fire department before initiating site activities regarding response to fire incidents associated with site work. In the event of a fire, the following will be implemented:

- Large fire (beyond the immediate control of a small on-site fire extinguisher): The site alarm will be sounded; personnel will immediately evacuate and assemble at a predetermined upwind site location; the fire department will be called; and personnel will not reenter the fire area and will wait for fire department arrival; and
- Small fire (within the immediate control of a small on-site fire extinguisher): The site alarm will be sounded; trained personnel will use an on-site fire extinguisher to put out the fire. Area of the fire occurrence will be watched afterwards to assure re-ignition dos not occur.

Response to Chemical Spill Incident: A spill kit will be available onsite (located in designated area by the SSHO) with supplies for spill containment and control and includes: absorbent pads; solid absorbent; 55-gallon drums; fire extinguisher; PPE; eyewash supplies; and a first-aid kit.

In the event of a small chemical spill incident, the SSHO and Site Manager shall be immediately notified. The SSHO will obtain information regarding the spill and will respond immediately to the spill location. The SSHO shall determine the hazards and hazardous or toxic agents involved. As needed, the SSHO will contact the SHM to assist with the hazard assessment, evaluation, and control measures needed to perform the response. Atmospheric hazard monitoring, PPE, and work methods shall be implemented as specified by the SSHO in order to perform a response.

If containment can be done safely without exposure to personnel, the following will be implemented:

- Liquid chemical spills will be contained through prompt application of absorbents (e.g., absorbent pads or solid absorbent); and
- Solid chemical spills are contained by covering with sheet plastic (or by an equivalent method). Spilled material is collected in bags, drums, or other suitable containers and disposed of as required.

13.1.10 Critique of Response and Follow-up

Following an emergency incident, the SSHO shall conduct a critique (debrief) of the emergency incident response. Action items will be developed where deficiencies are identified during the incident debriefing. Follow up actions will be implemented to correct incident response deficiencies. Pertinent information from the incident critique will be communicated to site personnel during a safety meeting.

13.1.11 PPE and Emergency Equipment

PPE to include protective clothing and equipment and respiratory protective equipment will be readily available in the event of an emergency response incident. It is anticipated that the following PPE and safety equipment will be available on site: hardhats, safety glasses, face shields, gloves, disposable coveralls, boot covers, and air-purifying respirators with P100 cartridges.

Emergency supplies that will be immediately available at the site include: first-aid kit(s) (meeting EM 385-1-1 03.B.01 requirements); eye wash (15-minute unit meeting ANSI Z358.1-2004 or later); eyewash bottles; fire extinguisher(s); potable water; and spill kit supplies (e.g., absorbent pads; solid absorbent; container).

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14. REFERENCE

American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices, 2013.

NAVFAC Southeast. 2013. Performance Work Statement, Contract Task Order No. JM01, IDIQ Range Sustainment, Military Munitions Response; Environmental Compliance & Remediation Services in Puerto Rico, "UXO 1 (SWMU 77) Soil Removal at Naval Activity Puerto Rico (NAPR), Ceiba, PR" for Naval Facilities Engineering Command, Southeast," 06 June.

Safety Now! Controlling Chemical Exposures at Hazardous Waste Sites with Real-Time Measurements; Christopher S.E. Marlowe; AIHA Marketplace Publication Product ID: AHWK98-349; ISBN: 0-932627-90-0, 1998

United States Army Corps of Engineers. 2008. Safety and Health Requirements Manual. EM-385-1-1 and incorporated changes.

Navy/Marine Corps Installation Restoration Program Manual.

United States Department of Labor, Occupational Safety and Health Administration, Title 29, Code of Federal Regulations, Part 1910 and 1926, 2012.

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Attachment 1
SSHP Forms

AIR MONITORING LOG

Project Name:	
Project Location:	
Date:	
Conducted By:	
Page Number:	

Time	**Location**	**_____ (____)**	**_____ (____)**	**_____ (____)**	**_____ (____)**	**_____ (____)**

LEGEND:

VOC: Volatile organic compound
PID: Photoionization detector
FID: Flame ionization detector
LEL: Lower explosive limit
O_2: Oxygen meter
mg/m^3: Milligrams per cubic meter
ppm: Parts per million

AIRBORNE DUST MONITORING LOG

Project Name:	
Project Location:	
Date:	
Conducted By:	
Instrument:	
Page Number:	

Time	Location	ET (min.)	Conc (mg/m^3)	TWA (mg/m^3)	Max (mg/m^3)	STEL (mg/m^3)

LEGEND:
ET Elapsed Time
Conc Concentration
TWA Time-Weighted Average
Max Maximum
STEL Short-Term Exposure Limit
Min. Minutes
mg/m^3: Milligrams per cubic meter

EMERGENCY MEDICAL NOTIFICATION FORM

Employee Name:	
Mailing Address:	
Home Telephone:	

EMERGENCY NOTIFICATION INFORMATION

IN CASE OF EMERGENCY NOTIFY:
Name / Relationship / Telephone:
Name / Relationship / Telephone:
ALLERGIES
List any health-threatening allergies (i.e., medications, food, bee stings):
MEDICATIONS
List current medications that may affect the ability to safely operate equipment and machinery:
OTHER INFORMATION
List any other information that should be known in case of an emergency:

Name (print):	
Signature:	
Date:	

EQUIPMENT DECONTAMINATION RELEASE AUTHORIZATION

Date / Day:	
Project Name:	
Project Location:	
Equipment Type:	
Mfr / Model:	

Item	Inspection Description	Clean	Not Clean	N/A
1	Tires / Rims, outside			
2	Tires / Rims, inside			
3	Buckets / Blades			
4	Rippers / Other			
5	Cross-members			
6	Undercarriage			
7	Tracks			
8	Drive carriage			
9	Drip pans			
10	Brush guards			
11	Belly pans			
12	Scraper can interior			
13	Truck beds			
14	Frames			
15	Engine compartment			
16	Cab			

Equipment Use:

Decontamination Description:

I certify that I have inspected the equipment indicated above and have observed that visible material has been removed from the equipment.

Inspected By:	
Signature:	
Date:	

EXCAVATION SAFETY CHECKLIST
(Competent Person to Complete)

Date / Day:	
Project Name:	
Project Location:	
Competent Person:	
Excavation Description:	
Excavation Depth/Width:	
Permit # /Date:	

EXCAVATION INFORMATION

	Circle	**Describe**
Hazardous Atmosphere:	Yes / No	_____
Access / Egress:	Yes / No	_____
Traffic Control:	Yes / No	_____
Wet Conditions:	Yes / No	_____

Utilities:	**Circle**	**Company / Date**
Electrical:	Yes / No	_____
Gas:	Yes / No	_____
Telephone:	Yes / No	_____
Water:	Yes / No	_____
Sewer:	Yes / No	_____

Protective System Used:	**Circle**	**Describe**
Sloping:	Yes / No	_____
Benching:	Yes / No	_____
Shoring:	Yes / No	_____
Shielding:	Yes / No	_____

EXCAVATION SAFETY CHECKLIST (Continued)
Visual Soil Classification Test

Date / Time:	
Competent Person:	
Soil Sample Location:	

The Competent Person is required to make daily inspections of excavations, adjacent areas, and excavation protective systems. This checklist is completed by the Competent Person to document visual soil classification tests used to determine soil type(s) present in an excavation. A separate analysis is performed on each layer of soil in the excavation walls or if the excavation stretches over a distance where the soil type may change.

	Circle	**Describe**
Particle Type:		
Fine grained soil (cohesive):	Yes / No	_____
Coarse grained soil (sand/gravel):	Yes / No	_____
Water Conditions:		
Dry:	Yes / No	_____
Wet/Surface Water/Submerged:	Yes / No	_____
Surface Encumbrances:	Yes / No	_____
Previously Disturbed Soil:	Yes / No	_____
Layered Soils / Dip into Excavation:	Yes / No	_____
Exposure to Vibrations:	Yes / No	_____
Fissures / Cracking / Spalling:	Yes / No	_____
Hazardous Atmosphere:	Yes / No	_____
Confined Space Exposure:	Yes / No	_____
Vehicle Traffic Present:	Yes / No	_____

EXCAVATION SAFETY CHECKLIST (Continued)
Manual Soil Classification Test

Date / Time:	
Competent Person:	
Soil Sample Location:	

The Competent Person is required to make daily inspections of excavations, adjacent areas, and excavation protective systems. This checklist is completed by the Competent Person to document manual soil classification tests used to determine soil type(s) present in an excavation. A separate analysis is performed on each layer of soil in the excavation walls or if the excavation stretches over a distance where the soil type may change. Unconfined compressive strength tests are performed on undisturbed soils. No soil is Type A if the soil is fissured; subject to vibration; previously disturbed; or layered dipping into excavation on a slope of 4H:1V.

	Circle	**Describe**
Plasticity Test:		
Cohesive:	Yes / No	_____
Non-Cohesive:	Yes / No	_____
Dry Strength Test:		
Granular (crumbles easily):	Yes / No	_____
Cohesive (broken with difficulty):	Yes / No	_____
Thumb Penetration Test:		
Type A Soil (soil indented by thumb with very great effort)	Yes / No	_____
Type B Soil (soil indented by thumb with some effort)	Yes / No	_____
Type C Soil (soil easily indented by thumb with little or no effort)	Yes / No	_____
Pocket Penetrometer Test:		
Type A Soil (>1.5 tsf)	Yes / No	_____
Type B Soil (0.5 - 1.5 tsf)	Yes / No	_____
Type C Soil (<0.5 tsf)	Yes / No	_____

Soil Classification (Circle):	Type A / Type B / Type C
Excavation Protective System:	
Competent Person:	
Signature:	
Date:	

HAZARDOUS SUBSTANCE INVENTORY LIST

Project Name:	
Project Location:	

MSDS on File	Product Name	Manufacturer	Location and Container Type

HEAVY EQUIPMENT INSPECTION REPORT

Date / Day:	
Project Name:	
Project Location:	
Equipment Type:	
Mfr / Model:	

Inspection Description	Checked	Observations (readings, levels, condition, damage, repairs needed)
General appearance		
Hour meter reading		
Engine operation / check belts		
Engine oil / water level		
Transmission oil level		
Hydraulic / misc. oil level		
Brake operation / fluid level		
Grease		
Batteries		
Fuel level (gas / diesel)		
Hoses & fittings (air, hydraulic…)		
Operation / controls		
Tires / tracks		
Cab (mirrors, seatbelt, glass, horn, turn signals, lights, wipers)		
Back-up lights and alarm		
Fire extinguisher condition		
Coupling devices and connectors		
Exhaust system		
Blade / boom / bucket		
Frame, ladders and walkway		
Steering		

Defects and Repairs Needed / Comments:

Inspected By:	
Signature:	

POST AT JOB SITE

INCIDENT REPORTING AND INVESTIGATION PROCEDURES

(Injury/Property Damage/Liability Exposure/Spills/Fires/Near Miss Incidents)

Notify the Site Supervisor or Site Safety and Health Officer (SSHO) immediately of injuries, property damage, liability exposure, spills, fires, and near miss incidents. The Site Supervisor or his/her representative shall:

- Take care of injured personnel immediately and secure the area
- Secure remaining dangerous conditions to prevent accidents and additional damage
- Secure the incident scene to preserve information
- Identify employees involved in the incident and witnesses and obtain initial information
- Notify the Project Manager (PM), Corporate Health and Safety Manager (CHSM), and Corporate Risk Manager (RM) about the incident and receive instructions. Drug/alcohol testing may be needed. **Notify as soon as possible - No later than 2 hours of the incident**
- Initiate fact finding. Investigate the site, interview witnesses, and document circumstances and facts. Take photos of the incident area and equipment involved. Complete preliminary documentation forms. Depending upon incident severity and complexity, fact finding may involve other investigators as determined by the CHSM
- Complete required CAPE forms: Incident Statement by Employee, Incident Statement by Witness, Incident Report by Supervisor, Injury and Illness Report, Vehicle Accident Report, and/or Property Damage, Loss and General Liability Report. Submit all forms (if a form is not applicable write N/A on the form.)
- **Submit completed forms to the CHSM, RM and PM within 24 hours of an incident and immediately forward additional information as it becomes available**.

NOTE: Accidents resulting in a fatality or multiple hospitalizations require reporting to the nearest OSHA office within 8 hours (1-800-321-OSHA). This report shall be made by the CHSM. A written report shall follow that provides OSHA with all details of the accident required by 29 CFR 1904.8. Any equipment, material, or related evidence that might help in an investigation must not be moved except to prevent further accidents.

INCIDENT REPORTING CONTACT INFORMATION:

PM: _____ - Office _____ – Fax _____ – Cell _____

CHSM: Glen Mayekawa – Office (714) 599-9071 – Fax (714) 599-9087 – Cell (714) 920-7483

RM: Chris Caviness – Office (770) 908-7200 – Fax (770) 908-7219

FAILURE OF A CAPE EMPLOYEE TO PROMPTLY REPORT A SAFETY INCIDENT OR FAILURE TO PRESERVE AN ACCIDENT SCENE UNTIL AN INVESTIGATION IS COMPLETED, IS GROUNDS FOR DISCIPLINARY ACTION.

INCIDENT REPORT BY SUPERVISOR

Date / Time of Incident:
Project Name / Project No.:
Client Name / Location:
Specific Location of Incident:
Employees Involved in Incident (if applicable):
Detailed Description of Incident:
Primary Cause of Incident:
Contributing Cause(s) of Incident:
Recommendation for Preventing Such Incidents in the Future:
Supervisor Name (print):
Signature:
Date:

INCIDENT STATEMENT BY EMPLOYEE

Employee Name:
Date / Time of Incident:
Project Name / Project No.:
Client Name / Location:
Specific Location of Incident:
Describe What You Were Doing Just Before the Incident:
Detailed Description of How the Incident Occurred:
Names of Witnesses:
Other Relevant Information:
How Can the Likelihood of this Happening Again Be Reduced:
Employee Name (print):
Signature:
Date:

INCIDENT STATEMENT BY WITNESS

Witness Name / Address / Telephone:
Employer / Telephone:
Date / Time of Incident:
Project Name / Project No.:
Client / Location:
Specific Location of Incident:
DETAILED DESCRIPTION OF INCIDENT BASED ON PERSONAL OBSERVATION
Describe where you were and what you were doing just before the incident:
Describe any injuries:
Describe any property damaged:
Describe what was the apparent nature of the injury and/or damage:
Describe what personnel and/or equipment were involved:
Describe what caused the injury and/or damage:
Describe the sequence of events:
List any observed unsafe acts or conditions:
Names of other witnesses:
Other relevant information:
Witness Name (print):
Signature:
Date:

INJURY AND ILLNESS REPORT

Injured Employee Name:	Date / Time of Injury:
Social Security Number:	Date of Birth / Age:
Sex: M ☐ F ☐ # of Dependents:	Date of Hire:
Job Title:	Pay Rate:
Home Address:	Home Telephone:
CAPE Home Office:	Injury on CAPE Premises: Yes☐ No☐
Client / Location:	Injury on Client Premises: Yes☐ No☐
Specific Accident Location:	
Nature of Injury:	
Exact Body Part Injured:	
Medical Attention: None ☐ First Aid ☐ Paramedics ☐ Doctor ☐ Hospital ER ☐ Overnight ☐	
Medical Attention Description:	
Hospital / Doctor Name / Telephone:	
Hospital / Doctor Address:	
Date / Time Injury Reported / By Whom:	
Time employee began work:	Avg. # of hours worked per week:
Did employee leave work: Yes ☐ No ☐ When:	
Has employee returned to work: Yes ☐ No ☐ When:	
Note: Employee must present a return to work release from examining physician before return to work	
Did employee have a work activity restriction: Yes ☐ No ☐ Describe:	Dates restricted:
Did employee miss a regularly scheduled work shift: Yes☐ No☐	Dates missed:
Injury Incident Description:	
What actions have been taken to prevent recurrence:	
What was the employee doing just before the incident occurred?	
Witness Name:	Telephone:
Address:	Statement Attached: Yes ☐ No ☐
INVESTIGATION AND REVIEW (Report to CHSM within 2 hours of injury)	
Completed by Name (print) / Signature / Date:	
Title / Phone:	
Site Supervisor Name (print) / Signature / Date:	
Project Manager Name (print) / Signature / Date:	
CHSM Name (print) / Signature / Date:	
Attached to this report: ☐ Incident Statement by Employee ☐ Incident Report by Supervisor ☐ Incident Statement by Witness ☐ Photographs ☐ Maps/Sketches ☐ Other _____	
(Section to be completed by a CAPE Safety Team Representative)	

PROPERTY DAMAGE, LOSS AND GENERAL LIABILITY REPORT

Project Name / Project No.:
Project Location:
Project Manager / Supervisor:
Date / Time of Damage or Loss:
Description / Identification of damaged or lost property:
Location of damaged or lost property (before loss):
Detailed description of how the damage or loss occurred:
Cause and corrective action recommended to prevent recurrence:
OWNER
Owner of damaged or lost property Name / Telephone:
Address:
Employer Name and Address:
WITNESS
Witness Name / Telephone:
Witness Address:
Employer Name and Address:
WITNESS
Witness Name / Telephone:
Witness Address:
Employer Name and Address:
REPAIR COST
Repair or Replacement Cost:
Attachments: [ ] Photographs [ ] Police Report [ ] Incident Statement by Witness [ ] Incident Report by Supervisor [ ] Incident Statement by Employee [ ] Injury Report
Supervisor Name (print):
Signature:
Date:

SAFETY AND OCCUPATIONAL HEALTH DEFICIENCY TRACKING LIST

List and monitor the status of safety and health deficiencies in chronological order. Post this list on the project safety bulletin board (or post a notice as to its location) and update daily.

Date Deficiency Identified	Description of Deficiency	Name of Person Responsible to Correct Deficiency	Projected Date Deficiency to be Resolved	Date Deficiency Was Actually Resolved

SAFETY INSPECTION REPORT

Date / Day:	
Project Name:	
Project Location:	
Work Description:	
Comments:	

OBSERVATIONS

Safety Conditions Requiring Corrective Action	Corrective Action, Assignment, and Completion Date

Project Manager:	
Safety Inspector:	
Distribution:	

SAFETY MEETING ATTENDANCE ROSTER

Project Name:	
Project Location:	
Date:	
Topic:	

Name	Signature	Company

Conducted By:	
Signature:	
Date:	

SITE CONTROL LOG

Date / Day / Time:	
Project Name:	
Project Location:	

Time			
In	**Out**	**Name**	**Organization**

SITE SAFETY AND HEALTH PLAN DISTRIBUTION TO SUBCONTRACTOR

A copy of the CAPE Site Safety and Health Plan for the site is being provided to subcontractors who may be affected by activities covered under the scope of this plan. Distribution of the Site Safety and Health Plan to subcontractor firms and their designated contact person is with the understanding that subcontractor personnel involved in this project will review this document, abide by its provisions, and comply with OSHA and other applicable health and safety rules and regulations for work onsite.

Date	Name	Signature	Organization

SITE SAFETY AND HEALTH PLAN REVIEW

Project Name:	
Project Location:	
Date:	
Conducted By:	

I have reviewed the CAPE Site Safety and Health Plan for the above indicated site and understand the hazards and control measures required on this project.

I agree to follow the procedures outlined in this plan and to inform the CAPE Project Manager, Site Superintendent, and/or SSHO should any unsafe condition be noted.

I understand that failure to follow safety regulations can be reason for removal from this project.

Date	Name	Signature	Company

TAILGATE SAFETY MEETING RECORD

Date / Day**:**	Time**:**
Project Name**:**	Project Number**:**
Client**:**	Location**:**
Specific Location**:**	
Work Description**:**	
Comments**:**	
SAFETY TOPICS PRESENTED	
Protective Clothing / Equipment**:**	
Chemical Hazards**:**	
Physical Hazards**:**	
Emergency Procedures**:**	
Emergency Hospital**:**	
Hospital Telephone**:**	
Hospital Directions**:**	
Special Equipment**:**	
Other**:**	
NOTE: Company policy requires that you notify your supervisor of any injury or safety incident.	
SAFETY MEETING ATTENDEES	
Name Printed / Initial	Name Printed / Initial
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Meeting conducted by (print name / signature)**:**	

TRAINING ATTENDANCE ROSTER

Project Name:	
Project Location:	
Date:	
Topic	

Date	Name	Signature	Company

Instructor Name:	
Signature:	
Date:	

VEHICLE ACCIDENT REPORT

CAPE VEHICLE	
Date / Time:	Location:
Driver Name:	Accident Date:
Drivers License #:	State:
Driver Address:	Project Location:
Vehicle Year/Make /Model:	
License Plate #:	State:
Vehicle Owner (Circle): Owned / Leased / Rented / Private	
Vehicle Owner Name:	Telephone:
Vehicle Owner Address:	
Vehicle Damage:	Est. Repair Cost:
OTHER VEHICLE	
Driver Name:	Telephone:
Drivers License #:	State
Drivers Address:	
Vehicle Owner Name:	Telephone:
Vehicle Owner Address:	
Insurance Company:	Telephone:
Address:	Policy No.:
Vehicle Year / Make / Model:	Agents Name:
License Plate No.:	State:
Vehicle Damage:	
Passengers (list on back): Yes / No	Injuries (list on back): Yes / No
ACCIDENT DESCRIPTION	
Sketch Attached: Yes / No	Photos Attached: Yes / No
Description:	
WITNESS INFORMATION	
Witness Name:	Telephone:
Address:	
Statement Attached: Yes / No	
POLICE REPORT	
Police Department:	Telephone:
Police Officer Name:	Police Report #:
Date / Time Reported:	
INVESTIGATION AND REVIEW	
Report Prepared By / Date:	
Supervisor Name / Signature / Date:	

INSPECTION CHECKLIST: CONSTRUCTION SAFETY (REMCON)

Date / Supervisor:	
Project Name / Number:	
Project Location:	
Inspector(s):	

S=Satisfactory (check in box indicates entire category was satisfactory); U=Unsatisfactory; N =Not Applicable

PERSONAL PROTECTIVE EQUIPMENT		HAZ COM	
Safety glasses/goggles available and being used?		MSDS openly available to all employees?	
Face shield available for liquid handling/grinding tasks?		Flammable liquids are in approved safety cans?	
Hand protection used/worn as required?		Flammable liquids storage containers labeled properly?	
Foot protection worn as required?		All hazardous containers labeled appropriately?	
Hearing protection worn where required?		Supplies on hand for accidental chemical spills?	
Hard hats worn on construction site at the job?		**LADDER/STAIR SAFETY**	
Respirators if required? Type: _____		Ladders are safe and inspected as appropriate?	
Fall protection, full body harness & lanyard used at >6 ft?		Stair rails for 30-inch change in elevation or 4 risers?	
ELECTRICAL SAFETY		Stairs or ladder provided for access points >19-inch high?	
GFCI's used for portable electrical hand tools?		Extension & straight ladders extend 3-ft beyond landing?	
Electrical panels are labeled appropriately?		Stepladders are only used in open position?	
Light bulbs for lights protected from breakage?		**CONFINED SPACE**	
LO/TO is being used for appropriate tasks?		Confined space entry work? Posted?	
Strain relief integrity for cords and plugs intact?		Permit for entry into permit-required (2C) confined space?	
Extension cords rated for hard usage? (S, ST, SO, STO, SJ, SJO, SJT, or SJTO)		Fire/Rescue notified for permit-required (2C) confined spaces?	
Electrical cords inspected and all prongs are intact?		Air monitoring?	
Portable generators are grounded per NEC?		Training in place?	
Electrical power tools are double-insulated or grounded?		**MATERIAL HANDLING**	
COMPRESSED GASES		Employees operating PITs are trained on the equipment?	
Compressed gas cylinders stored secured and upright?		Wire rope used for lifting? Deterioration is absent?	
Oxygen/acetylene torch units have flash back arrestors?		Web slings used for lifting? Deterioration is absent?	
Compressed gas cylinders not in use have caps in place?		Crane used? Approved written plan on file with load capacities?	
EXCAVATION		Hooks used for lifting have safety latch in place?	
Excavation-ladders if > 4ft deep? Extend 3 ft? 25 ft apart?		**EMERGENCY/FIRST AID**	
Excavation – protection from cave-ins for > 5 ft?		Emergency phone numbers posted and known by all?	
Sloping, shoring evaluated?		Emergency eyewash and/or shower units accessible?	
Daily inspection?		First-aid kit available at work site?	
HAND TOOLS/POWER TOOLS		Fire extinguishers readily available (not blocked)?	
Grinders (portable and stationary) have guards in place?		Fire extinguishers inspected?	
Impact style air tools have safety clips/retainers installed?		Hot work/burn permits used for grinding, cutting, welding?	
Pneumatic power tools have hoses secured?		Exits marked? Not blocked?	
Portable circular saws equipped with protective guards?		**GENERAL SAFETY**	
Unsafe hand tools are prohibited?		General housekeeping is neat and orderly?	
Impact tools, hammers kept free of splinters/mushrooms?		Wall openings and floor holes are covered or guarded?	
OTHER		Rebar caps used for protruding bars?	
Permits in place (environmental, concrete penetration, digging, burning, Hot Work)? Employees signed? Y / N		Concrete work? Silica dust training documented for all? Respirators? Type: _____	
Tool-box safety talks conducted and documented?		Scaffolding–guardrails used?	
Safety training is current and documented.		Scaffold design by Qualified Person?	
Project-specific training conducted and documented?		Scaffold Competent Person? Name: _____	
Health & Safety Plan available? Reviewed with workers?		Lasers in use (Class 2 or 3A/3R only)? Area posted?	
Competent Person on site? Name: _____		Illumination adequate?	

PIT – Powered Industrial Truck (Forklift)

WELDING		BLASTING/PAINTING	

Are welding leads in good condition with NO visible damage within 10 feet of the rod/wire holder?		Are all pressure hoses inspected? (air, blast, etc.) Hoses are without cuts, blisters, soft areas, etc.?	
Are welding machines grounded?		Fittings on blast pot are secure?	
Are flammables store 50 ft. or greater from the work area?		"Deadman" control properly working?	
Are there requirements for a Fire Watch?		Are all hose connections and fitting safety wired, or clipped to ensure security?	
Are appropriate fire extinguishers available? Inspected?		Are Whip checks present and in good condition?	
Are welding hoods in good condition?		Are all hoses neatly laid out and without kinks?	
Is the appropriate shade available, is it in place?		Are all Blast hoods in a safe working condition?	
Are welding blinds necessary to protect others?		Proper lifting techniques used?	
Will wind or a breeze affect the work?		Hearing protection is worn when equipment is running?	
Hot Work Permit acquired, completed and signed?		Is the area Lead restricted and posted? Y / N	

INSPECTION CHECKLIST: CORRECTIVE ACTION PLAN

For all items marked as "U," list the item, person responsible, and expected completion date.

ACTION ITEM	PERSON RESPONSIBLE	DATE DUE	DATE VERIFIED[1]	VERIFIED BY[2]

OTHER OBSERVATIONS NOT RECORDED ABOVE

OBSERVABLE ITEM	REF.	PERSON RESPONSIBLE	DATE DUE	DATE VERIFIED[1]	VERIFIED BY[2]

[1] Date Observation/Corrective Action was verified as completed.
[2] Initials of the individual verifying the Observation/Corrective Action was verified, as completed.

Reference columns contain the OSHA regulation or other standard or regulation cited *if known*.

(check) ☐ **NO VIOLATIONS NOTED DURING THIS INSPECTION**

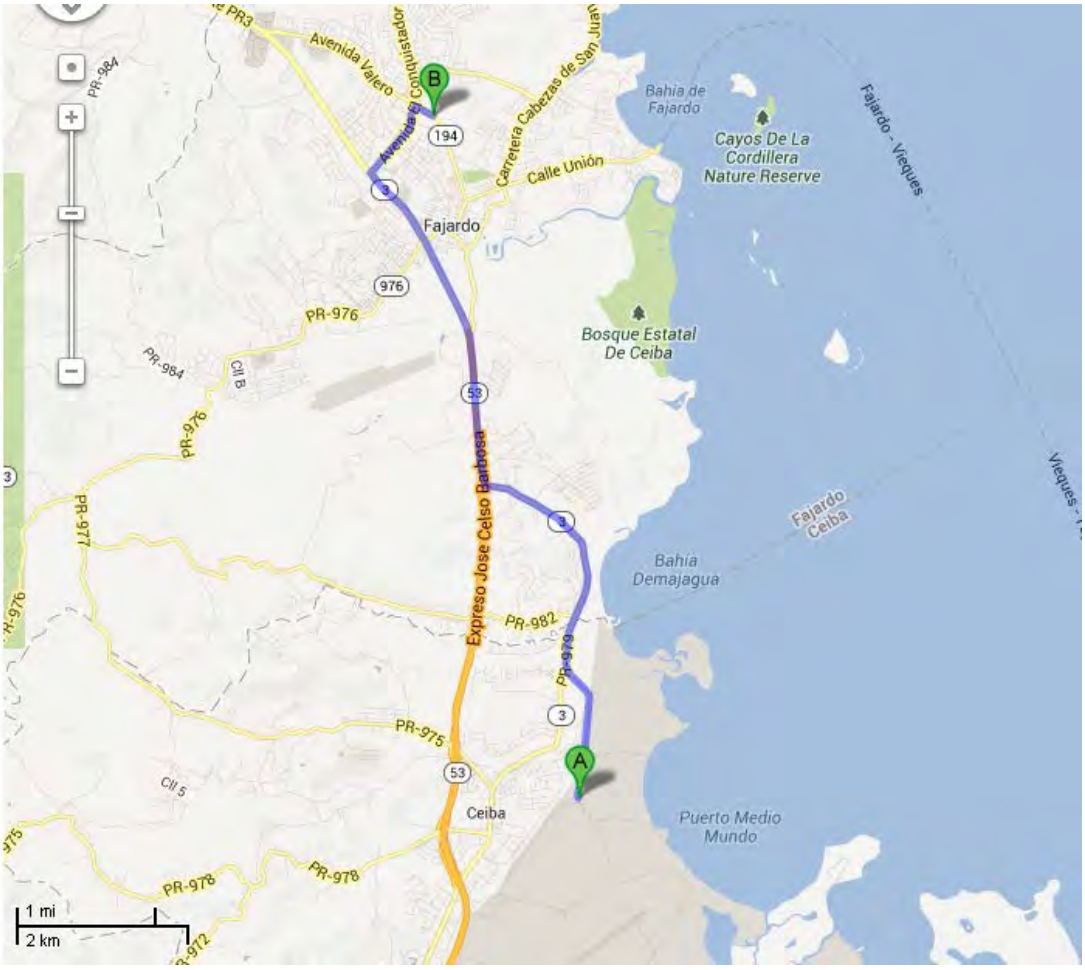
CAPE Inspector Name (Print): _____
CAPE Inspector Signature: _____

Attachment 2
Emergency Contact List and Emergency Hospital Route Map

EMERGENCY CONTACT LIST

Contact	Telephone Number
Ambulance/Paramedics/Fire/Police – Emergency	9-1-1
Emergency Hospital: Hospital HIMA San Pablo 404 General Valero Fajardo, PR 00738	9-1-1 or (787) 653-6060
National Poison Referral Service	(800) 222-1222
NAVFAC ATLANTIC RPM Stacin Martin	Office: (757) 322-4780
USA Environmental, Inc. Program Safety Manager; Cheryl M. Riordan, CSP	Cell: 813-426-2112
CAPE (Corporate - Atlanta, GA) 500 Pinnacle Court, Suite 100, Norcross, GA 30071	Office: (770) 908-7200 FAX: (770) 908-7219
Right Way HC 72 Box 3744 Naranjito, PR	Office: (787) 857-8832
Spill Emergency Response Subcontractor Caribe Hydroblasting Inc. (CHED) P.O. Box 790 Penuelas, PR 00624-0790 Raul Alacala	Office: (787) 836-1110 Fax: (787) 836-0577 Email: ralcala@chedcaribe.com
Senior Project Manager Brian Mattingly	Office: (513)846-0826 Email: bmattingly@usatampa.com
Right Way On-site Contact Pedro Tejada	Office: (787) 857-8832 Mobile: (787) 630-9881 Email: ptejada@rightwayPR.com
CAPE Site Manager/Quality Control Manager Golnaz Ashouri	Office: -- (678) 287-1356 Mobile: (404) 388-1003-- Email: gashouri@cape-inc.com --
CAPE Site Safety and Health Officer Robert Hernandez	Office: (210) 377-2008-- Mobile: (210) 452-8929-- Email: rhernandez@cape-inc.com --
CAPE Safety and Health Manager Ken Beatty, CSP, CHST	Office: (678) 287-1355 Mobile: (678) 480-5622 Email:kbeatty@cape-inc.com
CAPE Corporate Health and Safety Manager Glen Mayekawa, CIH	Office: (949) 236-3018 Mobile: (714) 920-7483 Email: gmayekawa@cape-inc.com
CAPE Corporate Risk Manager Chris Caviness, PE, CMQ/OE	Office: (770) 908-7200 FAX: (770) 908-7219 Email: ccaviness@cape-inc.com
CAPE Corporate Human Resources Manager Elena Linnar	Office: (949) 236-3000 ext. 252 FAX: (949) 231-1347 Email: elinnar@cape-inc.com

FIGURE 2
EMERGENCY HOSPITAL ROUTE MAP



Emergency Hospital:

Hospital HIMA San Pablo
La Avenida General Valero #404
Fajardo, PR 00738
(787) 653-6060

Emergency Hospital Route:

1. Exit the base and drive north of Route 3 toward Fajardo.
2. After entering town, you will pass the Del Este Shopping Center on your right.
3. After that, turn right onto Avendia El Conquistador.
4. Proceed approximately ½ mile and turn right onto Avendia General Valero
5. The hospital will be on your right.

<u>Note</u>: SSHO must drive emergency hospital route before start of field work.

Attachment 3
Subcontractor List

SUBCONTRACTOR LIST

Project Name:	Interim Corrective Measure, UXO 1 Soil Removal (SWMU 77)
Project Location:	Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico

Rightway Subcontractor (Waste Disposal) Waste Management of Puerto Rico Inc. "El Coqui Landfill" POC: Carlos Villanueva	Mobile: (939)969-4878
Rightway Subcontractor (Transportation and Disposal): Fraticelli Trucking Company, Inc. POC: Eduardo Fraticelli	Office: (787) 836-1610
Rightway Subcontractor (Emergency Spill Response) Caribe Hydroblasting Inc. (CHED) POC: Raul Alacala	Office: (787) 836-1110

Attachment 4
Resumes, Designations and Certifications

DESIGNATED FIRST-AID RESPONDER LIST

Project Name:	Interim Corrective Measure, UXO 1 Soil Removal (SWMU 77)
Project Location:	Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico

Designated personnel to act in the capacity of first-aid responders for medical emergencies on this project are indicated below.

Name	First-Aid Training	CPR Training	BBP Training
TBD			

Legend:

BBP: Blood borne Pathogen
CPR: Cardiopulmonary Resuscitation

DESIGNATED COMPETENT PERSON LIST

Project Name:	Interim Corrective Measure, UXO 1 Soil Removal (SWMU 77)
Project Location:	Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico

The personnel indicated below have been designated to perform as competent persons on this project.

Competent Person Description and OSHA 29 CFR 1926 Reference	Applicable	Competent Person
General Safety and Health Provisions (1926 Subpart C)	YES	SSHO
Occupational Health and Environmental Controls (Subpart D)	YES	SSHO
Personal Protective and Life Saving Equipment (Subpart E)	YES	SSHO
Fire Protection and Prevention (Subpart F)	YES	SSHO
Signs, Signals, and Barricades (Subpart G)	YES	SSHO
Rigging (Subpart H)	NO	SSHO
Hand and Power Tools (Subpart I)	YES	SSHO
Welding and Cutting (Subpart J)	NO	SSHO
Electrical (Subpart K)	YES	SSHO
Scaffolding (Subpart L)	NO	NA
Fall Protection (Subpart M)	NO	NA
Cranes, Derricks, Hoists, Elevators, & Conveyors (Subpart N)	NO	NA
Motor Vehicles, Mechanized Equipment and Marine Operations (Subpart O)	YES	SSHO
Excavations (Subpart P)	YES	SSHO
Concrete and Masonry (Subpart Q)	NO	NA
Steel Erection (Subpart R)	NO	NA
Underground Construction, Caissons, Cofferdams, and Compressed Air (Subpart S)	NO	NA
Demolition (Subpart T)	NO	NA
Blasting and Use of Explosives (Subpart U)	NO	NA
Confined Spaces (29 CFR 1910.146)	NO	NA
Other (Specify):		

Robert B. Hernandez, Jr., PG, CAPM
SSHO/Senior Project Geologist

Why Selected? More than 29 years of geological and quality control experience ❖ Experience with privatization transition for military facilities ❖ Extensive experience in environmental investigation/remedial action, construction oversight, quality assurance/quality control, and environmental/geotechnical drilling technologies

14.1.1 Education

- BS, Applied Science/Geology, University of Texas, San Antonio, TX, 1985

14.1.2 Professional Registrations

- Professional Geoscientist, Texas, #508, 2003 (Expires 2015)
- Professional Geologist, Alabama, #877, 1999 (Expires 2016)
- Professional Geologist, Mississippi, #0153, 1997 (Expires 2015)
- Texas LPST Corrective Action Project Manager, #CAPM00484, 1997 (2015)

14.1.3 Certifications/Specialized Training

- 40-Hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HazWOPER) Training, 1990
- 8-Hour OSHA HazWOPER Refresher Training, 2015 (Current)
- 8-Hour OSHA HazWOPER Supervisor Training, 1991
- 30-Hour OSHA Construction Safety and Health Training, 2009
- First Aid (2013) and Adult Cardiopulmonary Resuscitation (CPR) (2015) Certified (Current)
- Safety Leadership Training for Supervisors, 2009
- Department of Transportation Hazmat Training, 2007
- U.S. Army Corps of Engineers (USACE) Construction Quality Management for Contractors, 2013
- Excavation Safety Training, 2005
- Confined Space Entry Training, 1994
- DOT Compliance Training for Hazardous Materials Transportation, 1994
- Geotechnical Sample Collection Training, PSI, 1987
- Nuclear Measurement Services Training for the Use of Nuclear Testing Equipment, 1985

14.1.4 Summary of Experience

Rob has more than 29 years of experience providing geologic and quality control/quality assurance (QA/QC) services for environmental, geotechnical, archaeological, legal, and land development projects. As a Senior Project Geologist, Rob's expertise lies primarily in the implementation of environmental investigative and remedial action technologies, including sampling for surface and subsurface soil, groundwater, surface water, and sediment using various sampling techniques (Shovel Test , Pot Hole sampling, Trench sampling, in situ sampling, Spit Spoon, Hand Auger, Cone Penetrometer, Trap Samplers, Torpedo Samplers, Discreet Interval Samplers) and drilling methods (Hollow Stem Auger, Mud Rotary, Air Rotary, Direct Push, Horizontal, and Sonic Drilling). His project management skills include all portions of project development and design through project completion in both the public and private sectors. He is a veteran of more than 200 (Phase I, Phase II, and Phase III) environmental site assessments, geophysical studies, and historical document

searches. Rob's responsibilities include development of site-specific scopes of work, project design and specification, field operations, implementation of remedial action technologies, operation and maintenance of remedial systems, project management, reporting and budget control, QA/QC, site safety. Provides documentation in support of field activities.

His expertise covers sites in Texas, Louisiana, Mississippi, Alabama, Arizona, Arkansas, Tennessee, California, Colorado, Kansas, Missouri, Maryland, Massachusetts, Michigan, Nevada, New York, New Jersey, Pennsylvania, South Dakota, and Virginia. Rob has a bachelor's degree in applied science/geology and is a Licensed Professional Geologist in Alabama and Mississippi. Rob is a licensed Geoscientist and Corrective Action Project Manager in the State of Texas.

14.1.5 Experience

AUG 01–present CAPE, San Antonio, TX

AFCEC, Emergency Planning and Community Right-to-Know Act (EPCRA) Reporting and Sampling, Analysis, And Monitoring (SAM) Joint Base McGuire-Dix-Lakehurst (JB MDL), New Jersey, $99,754 FFP, 4/2015 – present. Senior Project Geologist. Responsibilities are to provide oversight and assistance during environmental investigations, provide sample collection, and support site data collection at JB MDL. Responsible for providing environmental sample collection and reporting support to the annual Perchlorate in Groundwater Report for the Open Detonation Unit - Verdun Range 2015 Sampling and Analysis.

AFCEC, Performance-Based Remediation (PBR) at Joint Base San Antonio (JBSA): Camp Bullis, Fort Sam Houston and Lackland AFB, TX, $24.4M FFP, 9/2011 – present. Senior Project Geologist. Responsibilities are to provide oversight during environmental investigations, provide sample collection, and support site remediation to complete the site closure activities at 21 sites associated with petroleum storage tanks and heating oil tank sites at JBSA. Responsible for providing environmental sample collection support to complete the site closure activities at Stokes Mortars Munition (FR001) and the 75mm Munitions Site (FR004).

AFCEC, Asbestos Abatement and Facility Decommissioning of Buildings 140 and 175E, Brooks City-Base, TX, $1M FFP, 9/2011 – 2-2015. Senior Project Geologist. Responsibilities consist of QA/QC and H&S oversight during all phases of project activities including: stormwater and erosion control, asbestos abatement, utility decommissioning (disconnect and capping), demolition/recycling, and waste/debris segregation.

USACE Kansas City District, Burn Pads 5, 6, and Trenches Closure Work, KSAAP, Parsons, KS, $12.7M FFP, 9/2011–5/2013. Senior Project Geologist. Responsible for providing environmental sample collection support to complete the site closure activities at Burn Pads 5 and 6 and associated trenches.

Phillips Plastics Corporation, Fredonia, WI.. Senior Project Geologist. Responsibilities included field oversight during the removal of residual contaminated soils using vertical shaft Caisson/Pier drilling. The project involved remediation (environmental restoration) of contaminated soil and groundwater by in-situ chemical oxidation (ISCO) using an ISCO Soil Treatment Remedy.

AECOM, Southern California Edison – Eldorado to Ivanpah Transmission Project, San Bernardino County, CA and Clark County, NV. Senior Project Geologist. Responsibilities included the field oversight of General Monitoring Team during the removal of an overhead ground wire (OHGW) from 500kV lattice transmission line towers and installation of a new fiber optic ground wire (OPGW). The CAPE Team also inspected construction activities at material lay-down yards and along a 25 mile right-of-way monitoring construction crews for adherence to mitigation measures designed to minimize and avoid impacts to nesting migratory birds, raptors, desert tortoise,

and best management practices (BMPs) associated with an approved stormwater pollution prevention plan (SWPPP) and Dust Control Plan.

USACE, Monitoring Well Plugging and Abandonment and Air Sparge System Demolition, Gillette, WY, $12.88M FFP, 9/2011 – 7/2012. Senior Project Geologist. Responsibilities included field oversight during the plugging and abandoning of the monitoring well network, demolishing the air sparge system, removing the buildings used for remediation activities, and final site restoration and seeding at the Hoe Creek In-Situ Coal Gasification Site located near Gillette, Wyoming. The system demolition was performed as per directions from the Wyoming Department of Environmental Quality (WDEQ) and in accordance with Chapter 11, Non-coal In Situ Mining Rules and Regulations Sections 8 and 15 (05/03/2005), and ASTM 5299 – 99, Standard Guide for Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices used for Environmental Activities.

USACE, Open Detonation Area Kick-Out, Grenade Test Range, and Furnace Area MEC Clearance, and Burn Pads 5, 6 & Trenches Closure Work Kansas Army Ammunition Plant (KSAAP), Parsons, KS, $17.5M FFP, 9/2011 – 5/2013. Senior Project Geologist. Responsible for providing environmental sample collection support to complete the site closure activities at Burn Pads 5 and 6 and associated trenches at the KSAAP.

URS/UMETCO, East Gas Hills Reclamation Project Above Grade Tailings Impoundment and A-9 Repository Erosion Protection Enhancement, WY, $1.87M FFP, 6/2011 – 12/2011. Senior Project Geologist. Responsibilities consisted of QA/QC oversight during all phases of project activities including: Storm Water Management and Erosion Control, Dust Control, establishing Access and Haul Routes to include Traffic and Safety Control on the County roads, Excavation and backfill of Radon Barrier Test Trenches, Rattlesnake Quarry rock crushing operations, Erosion Protection Enhancement/Bedding Repair, Launch Rock Structure Erosion Protection Enhancement, Apron Channel construction, Stabilization of Off-Site Erosion Features, Well Abandonment, Fencing, and Site Reclamation.

AFCEC DBR2, Electrical Resistance Heating (ERH) Remedial Action (RA) at Site S-1 (SS003), Former Kelly AFB, San Antonio, TX, $1.67M FFP, 6/2010–9/2011. Senior Project Geologist. Responsibilities initially included obtaining all necessary federal, state and local permits for the S-1 Groundwater Treatment Plant (GWTP) location. Rob's project responsibilities included the field oversight of the drilling and installation of vertical ERH/SVE wells to address chlorinated solvent contamination. Remedial activities included: the installation of twelve (12) Temperature Monitoring Points (TMP); fifty four (54) electrodes and vapor recovery wells with the designed intent for conductive heating of the area soils and groundwater, volatilization of contaminates, and condensate recovery from the solvent-impacted soil. The system components included the ERH power control unit with a dedicated computer and data acquisition software, vapor recovery blowers and conveyance piping, manifolded carbon adsorption units, ERH electrical system controls. Remedial activities included start-up and operation of the ERH system, collection of operational, system efficiency, and confirmation samples to demonstrate contaminate reduction to the targeted Risk Reduction Standard #2. Reused material from similar TO performed under WERC contract including valves and piping from SVE system and 25,000 feet of electrical wiring, providing a cost savings of >$60K.

USACE Sacramento, Preliminary Assessment and Site Inspection, FUDS, San Francisco, CA, $205K FFP, 2007–2010. Senior Geologist. Evaluation of 54 sites to determine that NDAI or if they should proceed to the SI phase. On-site responsibility for H&S, QA, geology, and sampling. Performing geophysical surveys to locate potential Underground Storage Tanks (USTs) and abandoned fuel piping; Drilling soil borings and collecting soil samples and in-situ groundwater samples at non-UST areas of interest; and disposing investigation-derived waste collected during the SI.

AFCEC, Environmental Services Contract, Former Kelly AFB, TX, $5.6M FFP/PBC, 2007–2008. Senior Geologist. Environmental drilling, well installation and de-commissioning, soil/groundwater sampling, waste management, monitoring well surveys, soil borings, AF property parcels for transfer, ERPIMS data submittals, and preparation of deed recordation packages for submittal.

AFCEC, Environmental Services at the Central Regional Bases, $1.2M CPFF, 8/2007–9/2012. Senior Project Geologist. Multiple environmental services and site investigations simultaneously at the former Kelly AFB, TX; Carswell AFB, TX; Chanute AFB, IL; and Richards-Gebaur AFB, MO. Project oversight for multiple environmental/construction projects, task assignments as defined by AFRPA includes environmental services and all phases of site investigations which include; drilling, well installations, soil/groundwater sampling activities, waste management, and any other remedial repair or maintenance work that requires a rapid resolution/response. As the site geologist/superintendent/SSHO his responsibilities include all aspect of site management, construction oversight and QA/QC, environmental sampling, client interface, and report development. Provides rapid response to environmental issues as they arise including discussion with client to determine appropriate response and then implementing that response without delay.

AFCEC, Corrective Measures Implementation (CMI), Former Kelly AFB, San Antonio, TX, $4.9M FFP, 6/2006–12/2009. Senior Project Geologist. CMI Phase I, II, and III at solid waste management units within the 300 and 600 areas included obtaining all necessary federal, state and local permits; the field oversight during remedial action at multiple location designated by the Air Force Civil Engineer Center (AFCEC) and the Air Force Base Conversion Agency (AFBCA). Under Phase I at the former Kelly AFB, Rob's project responsibilities included the field oversite of the drilling and installation of four vertical SVE wells to address chlorinated solvent contamination. Another component of the Phase I activities was the floor demolition, excavation of approximately 315 cubic yards of suspected contaminated soils, confirmation sampling of the excavation bottom and sidewalls, and site restoration of an interior section of a abandoned maintenance facility.

A third component of the Phase I remedial activities included bioaugmentation in the form of organic substrate injection to address TCE contamination of the semi-confined saturated zone soils. Forty (40) temporary injection boreholes were advanced to approximately 40 feet feet below ground surface (bgs). Each borehole was injected with 50 gallons of emulsified vegetable oil.

The final component task of the Phase I activities was the directional drilling and and forward reaming installation of three (750 foot long) horizontal SVE wells beneath an active engine maintenance facility to address chlorinated solvent contamination. System start up and testing were also included on this TO for both the vertical and horizontal SVE systems.

Phase II remedial activities included: the installation of 218 electrodes and vapor recovery wells with the designed intent for conductive heating of the area soils and groundwater, volatilization of contaminates, and condensate recovery from the solvent-impacted soil. The system components included the ERH power control unit with a dedicated computer and data acquisition software, vapor recovery blowers and conveyance piping, manifolded carbon adsorption units, ERH electrical system controls. Remedial activities included start-up and operation of the ERH system, as well as collection of confirmation samples to demonstrate contaminate reduction to the targeted Risk Reduction Standard #2.

Phase III activities included the abandonment of three existing montioring well along 34th Street, milling of the asphalt surface in preparation for re-paving , repaving of approximately 3000 square

feet of roadway and the installation of three replacement monitoring wells immediately north of the former Kelly AFB. All work conformed to the City of San Antonio paving and infrastructure specifications.

Responsibilities include field and QA/QC oversight for the duration of this project including drilling, installation of vertical and horizontal SVE wells, installation of electrodes and vapor recovery wells, installation of remediation system components, and operations and maintenance of the ERH system to address chlorinated solvent contamination at five different sites. Provided rapid resolution of problems as they arose, minimizing impacts to project goals and leading to successful implementation of remediation remedies at each of these sites, including site closure at three of the sites.

NOV 00–AUG 01 Sol Engineering, San Antonio, TX

- *GEOSCIENCES MANAGER*

Provided project oversight for multiple environmental and geotechnical projects in the San Antonio area, including work performed by Kelly AFB Environmental Management, Lackland AFB (37 CES/CEV), and various local and out-of-state environmental consultants. Work includes project management during all phases of site investigations to include; drilling, well installations, soil/groundwater sampling activities, and waste management.

NOV 98–NOV 00 Operational Tech. Corp., San Antonio, TX

- *PROJECT GEOLOGIST*

Greater Kelly Development Association (GKDA), San Antonio, TX, 11/1998 – 11/2000. Project Geologist/Industrial Waste and Construction Mnaager. Performed historical research of various properties, preconstruction characterization sampling, and waste management. Additional duties included detailing regulatory and environmental issues and development of environmental protocols for the construction manager (EG&G) and provided routine inspections of various operations for the purpose of detailing compliance with environmental protocols.

Air National Guard, Harrisburg, PA, 5/2000–7/2000. Project Geologist. Work includes project management and environmental oversight for polychlorinated biphenyl (PCB) remediation project. Work included environmental/construction oversight during the excavation and on-sight remediation of contaminated soils.

Kelly AFB, San Antonio, TX, 11/1998–5/2000. Project Geologist/Environmental Manager. Environmental oversight for multiple construction projects, including work performed by San Antonio Water Systems (SAWS), San Antonio City Public Service (CPS), and Southwestern Bell (SWB). Work included environmental/construction oversight for the Boeing facility modification to include; installation of liquid collection system for aircraft corrosion protection/painting facilities, asbestos and lead abatements as part of the hangar door and internal building modifications. Also performed materials classification, sampling, and waste management.

47th CES/CEV, Laughlin AFB, Del Rio, TX, 6/1999. Project Geologist. Performed Compliance Assurance Pollution Prevention (CAPP) activities. Work included, compliance site inventory for air, water, and waste developed at the installation.

HEB Distribution Facility, San Marcos, TX, 4/1999. Project Geologist. Performed a field investigation including soil investigation, drilling, and sampling with a geoprobe.

Jacobs Environmental, Massachusetts Military Reservation, Cape Cod, M, 11/1998–12/1998. Project Geologist. Assisted in a regional soil and groundwater delineation project which entailed drilling soil boring, monitoring well installation, and groundwater sampling.

JUN 90–NOV 98 Malcolm Pirnie, San Antonio, TX

- *HYDROGEOLOGIST*

Provided site project management/oversight for multiple environmental investigation projects at various local and out-of-state sites. Work included environmental oversight during drilling investigations, well installations, groundwater sampling, and remedial activities.

A-1 Rental Facilities, Dallas/Ft. Worth, TX. Hydrogeologist. Performed a series of multi-site Phase I and Phase II investigations. Work included environmental investigation of five facilities for investment/divestment purposes.

Former Sprague Electric Company Site, American Premier Underwriters, Visalia, CA. Hydrogeologist. Performed soil and groundwater investigation: drilling, installation, and sampling of monitoring well

Northrop Grumman Corporation, Anaheim, CA. Hydrogeologist. Performed soil and groundwater investigation: drilling, installation, and sampling of monitoring well with redevelopment and sampling of existing monitoring wells.

County of Bexar, San Antonio, TX. Hydrogeologist. Performed construction oversight, QA/QC, and confirmation sampling of remediation activities at two county service center sites.

San Felipe Springs, Water Expansion Project Del Rio, TX. Hydrogeologist. Performed archaeological and geotechnical investigation. Work included soil boring and sampling to determine location of Karst zones and artesian water producing fractures. Oversight of archaeological investigation to determine significance of prehistoric and historic artifacts recovered from installation activities associated with a new pipeline route.

Westinghouse, Inc., Ft. Smith, AR. Hydrogeologist. Performed Phase III field investigation. Work included oversight of an Electromagnet Offset Logging (EOL) evaluation to determine, 3-D changes in relative electrical resistivity. Environmental boring investigation using Stratoprobe, purging and sampling of existing monitoring wells; monitoring well drilling/installation, and sampling of up gradient and cross gradient monitoring wells.

USACE, Ft. Bliss, El Paso, TX. Hydrogeologist. Performed construction/environmental oversight and QA/QC of multiple site remediation (thermal desorption) activities, soil and groundwater investigations.

Aluminum Lithographic Plate Manufacturer, Jacksonville TX. Hydrogeologist. Performed field investigation for a manufacturer of aluminum lithographic plates in Jacksonville, TX. Work included soil boring sampling, monitor well drilling and installation, short term aquifer testing, and well sampling. Provided construction oversight, QA/QC, and area monitoring during the stabilization, excavation and disposal of the settling pond material (Aluminum Oxide) to ensure conformance with

U.S. Environmental Protection Agency (EPA) and Texas Natural Resource Conservation Commission (TNRCC) regulations.

City of Houston Ley Road/CASCO Landfill, Houston TX. Performed environmental oversight for the City of Houston Ley Road/CASCO Landfill project in Houston TX. Project work entailed manifesting and removal of (unknown) drummed hazardous waste and related construction activities.

City of Houston Petroleum Storage Tank Program, Houston, TX. Performed construction administration and oversight for the City of Houston Petroleum Storage Tank Program. Supervised the excavation and construction activities of various subcontractors during removal and installation of underground storage tanks (USTs), and oversight and inspection during the upgrading of the remote sensor and alarms systems.

Bexar County, TX. Hydrogeologist. Performed field investigations of an environmental compliance audit for Bexar County TX. Fieldwork included a magnetometer survey and confirmation sampling using a total petroleum hydrocarbon (TPH) infrared spectrometer.

Texas Department of Transportation Highway Expansion Project, Texas Rio Grande Valley, TX. Hydrogeologist. Performed field investigations for the Texas Department of Transportation (TX DOT) Highway Expansion Project in the Texas Rio Grande Valley.

City of Houston, La Villa de las Flores Site, Houston, TX. Hydrogeologist. Performed field investigation and construction oversight at the City of Houston La Villa de las Flores site (non-leachable lead remediation project). Work included soil boring drilling, installation of cased monitoring wells, aquifer testing, well sampling, and stabilized soil confirmation sampling.

TX DOT CTMS Building Site, Houston TX. Hydrogeologist. Performed field investigations for TX DOT CTMS building site in Houston, TX. Work included drilling and monitor well installation, aquifer testing, and groundwater sampling.

Michigan Department of Natural Resources, Thomas Solvents of Detroit, Rawsonville, MI. Hydrogeologist. Performed field investigations for the Michigan Department of Natural Resources at the Thomas Solvents of Detroit site. Fieldwork included monitor well drilling and installation, gamma ray logging, and vertical aquifer sampling (VAS).

Pima County Wastewater Management Department, El Camino del Cerro Landfill, Tucson, AZ. Hydrogeologist. Performed field investigations for a Methane Mitigation Project. Level C site work included soil borings, monitoring well installation, and chemical and radiological monitoring.

City of San Antonio, Durango Street Overpass, San Antonio, TX. Hydrogeologist. Performed field investigations including soil borings, monitor well installations, groundwater sampling, and aquifer testing.

TEMCO Liquids Plant, Lake Charles, LA. Hydrogeologist. Performed field investigations at TEMCO Liquids Plant in Louisiana. Field investigation included soil borings, monitor well installations, groundwater sampling, and aquifer testing.

City of San Antonio, Frio Street site, San Antonio, TX. Hydrogeologist. Performed field investigations for the City of San Antonio at the Frio Street site. Fieldwork included magnetometer surveys, cone penetrometer testing, soil borings, monitor well installations, groundwater sampling.

Texas Natural Resource Conservation Commission, Multi-Site Petroleum Storage Tank Project, TX. Hydrogeologist. Performed field investigations for the TNRCC Multi-Site Petroleum Storage Tank Project. Work included soil borings, monitor well installations, groundwater sampling, and aquifer testing. Participated in field activities at 29 sites in South Texas.

Newsom Brothers Superfund Site, Columbia, MS. Hydrogeologist. Performed field investigations at the Newsom Brothers Superfund site in Columbia, Mississippi. Crewmembers work included soil borings, flooded building sediment sampling, and trenching activities.

1990 Gisler Bros. Loggin, Gulf Coast States

- *MUDLOGGER*

Monitored gas chromatograph, thermo-conductivity, and catalytic conductivity meters for oil and gas production activity. Classified cuttings by lithology type and formation during introduction of horizontal investigative drilling techniques in south Texas.

1990 Jones Env. Drilling, San Antonio, TX

- *GEOLOGIST/OFFICE MANAGER*

Managed the installation of recovery and monitor wells and the coordination of crews and materials.

1989 KEI Consultants, San Antonio, TX

- *GEOLOGIST*

Performed environmental and geotechnical soil sampling and classification, installation of recovery and monitor wells, UST removals, coring and classification of asphaltic concrete, soil lab testing.

1986-1988 Professional Svc. Industries, San Antonio, TX

- *TECHNICIAN LEVEL III, SHILSTONE ENGINEERING TESTING LABORATORY DIVISION*

Performed variety of field/laboratory geotechnical tests and was responsible for the testing of construction materials such as concrete and asphalt for construction QA/QC purposes.

1985-1986 Brytest, San Marcos, TX

- *MATERIALS TECHNICIAN*

Responsible for testing and sampling of construction materials, performing lab analysis for proctors, testing moisture-density relationships using Troxler Nuclear gauge, and Swiss Hammer hardness test.

JUL 75–JUL 79 U.S. Army, Post Vietnam Era

- *SGT. E-5, MECHANIZED INFANTRY*

14.1.6 Regulatory Experience

Rob has extensive experience working with federal and state regulators in evaluating and negotiating cleanup criteria. He has over 23 years of experience working with RCRA, CERCLA, SARA, LUST, TSCA, CWA/OPA (Clean Water Act/Oil Pollution Act), Clean Air Act (CAA), National Contingency Plan (NCP), and other federal, state, and local regulations. Rob has managed/assisted at several EPA investigations/remedial action projects in Region 6 (Texas, Louisiana), and Region 4 (Mississippi).

CERTIFICATIONS FOR PROJECT PERSONNEL

Will be maintained in the on-site copy of the Final version of this Document

Attachment 5
Material Safety Data Sheets

Will be maintained in the on-site copy of the Final version of this Document

SAFETY DATA SHEET

CITGO No. 2 Diesel Fuel, Low Sulfur, All Grades

Section 1. Identification

GHS product identifier : CITGO No. 2 Diesel Fuel, Low Sulfur, All Grades

Chemical name : Fuels, diesel, No 2

Synonyms : No. 2-D Grade Diesel Fuel Oil (defined by ASTM D-975); Treated or Refined Diesel Fuel No. 2; Grade 2 Distillate Fuel; Hydrodesulfurized Middle Distillate; C9-C16 Petroleum Hydrocarbons

Code : Various

MSDS # : AG2DF

Supplier's details : CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210
sdsvend@citgo.com

Emergency telephone number : Technical Contact: (832) 486-4000
Medical Emergency: (832) 486-4700
CHEMTREC Emergency: (800) 424-9300
(United States Only)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY: INHALATION - Category 4
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2B
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) [central nervous system (CNS)] - Category 2
ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Flammable liquid and vapor.
Harmful if inhaled.
Causes skin and eye irritation.
Suspected of causing cancer.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure. (central nervous system (CNS))

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Fuels, diesel, No 2

Other means of identification : No. 2-D Grade Diesel Fuel Oil (defined by ASTM D-975); Treated or Refined Diesel Fuel No. 2; Grade 2 Distillate Fuel; Hydrodesulfurized Middle Distillate; C9-C16 Petroleum Hydrocarbons

CAS number/other identifiers

CAS number : 68476-34-6

Ingredient name	%	CAS number
Ethyltoluene	<3	25550-14-5
Trimethylbenzene, all isomers	<2	25551-13-7
Naphthalene	<2	91-20-3
Biphenyl	<2	92-52-4
Cumene	<1	98-82-8
Xylenes, mixed isomers	<1	1330-20-7
Ethylbenzene	<1	100-41-4

* = Various ** = Mixture *** = Proprietary

Any concentration shown as a range is to protect confidentiality or is due to process variation.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Harmful if inhaled.

Skin contact : Causes skin irritation.

Ingestion : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : 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.

Specific treatments : Treat symptomatically and supportively.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Specific hazards arising from the chemical : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container. Non equilibrium conditions may increase the fire hazard associated with this product. Always bond receiving containers to the fill pipe before and during loading. Always confirm that receiving container is properly grounded. Bonding and grounding alone may be inadequate to eliminate fire and explosion hazards. Carefully review operations

Section 7. Handling and storage

that may increase the risks such as tank and container filling, tank cleaning, sampling, gauging, loading, filtering, mixing, agitation, etc. In addition to bonding and grounding, efforts to mitigate the hazards may include, but are not limited to, ventilation, inerting and/or reduction of transfer velocities.
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 a dissimilar product).

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Bulk Storage Conditions: Maintain all storage tanks in accordance with applicable regulations. Use necessary controls to monitor tank inventories. Inspect all storage tanks on a periodic basis. Test tanks and associated piping for tightness. Maintain the automatic leak detection devices to assure proper working condition.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Trimethylbenzene, all isomers	**ACGIH TLV (United States, 4/2014).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours.
Naphthalene	**ACGIH (United States). Absorbed through skin.** TWA: 10 ppm 8 hours. STEL: 15 ppm 15 minutes. **OSHA (United States).** TWA: 10 ppm 8 hours. **ACGIH TLV (United States, 4/2014). Absorbed through skin.** TWA: 10 ppm 8 hours. TWA: 52 mg/m³ 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 10 ppm 8 hours. TWA: 50 mg/m³ 8 hours.
Biphenyl	**OSHA PEL Z2 (United States).** TWA: 0.2 ppm 8 hours. **ACGIH TLV (United States, 4/2014).** TWA: 0.2 ppm 8 hours. TWA: 1.3 mg/m³ 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 0.2 ppm 8 hours. TWA: 1 mg/m³ 8 hours.
Cumene	**ACGIH TLV (United States, 4/2014).** TWA: 50 ppm 8 hours. **OSHA PEL (United States, 2/2013). Absorbed through skin.**

Section 8. Exposure controls/personal protection

	TWA: 50 ppm 8 hours. TWA: 245 mg/m³ 8 hours.
Xylenes, mixed isomers	**ACGIH TLV (United States, 4/2014).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 4/2014).** TWA: 20 ppm 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, vapor controls, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Splash goggles. Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. chemical splash goggles. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or supplied-air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Physical state	:	Liquid.
Color	:	Colorless to light yellow or red.
Odor	:	Characteristic.
pH	:	Not available.
Melting point	:	-30 to -18°C (-22 to -0.4°F)
Boiling point/boiling range	:	282 to 338°C (539.6 to 640.4°F)
Flash point	:	Closed cup: 52°C (125.6°F) [Pensky-Martens.]
Evaporation rate	:	<1 (butyl acetate = 1)
Lower and upper explosive (flammable) limits	:	Lower: 0.6% Upper: 6.5%
Vapor pressure	:	0.27 kPa (2 mm Hg) [room temperature]
Vapor density	:	5 [Air = 1]
Relative density	:	0.84
Density lbs/gal	:	Estimated 7 lbs/gal
Gravity, °API	:	Estimated 37 @ 60 F
Solubility	:	Very slightly soluble in the following materials: cold water.
Solubility in water	:	0.005 g/l
Partition coefficient: n-octanol/water	:	>3.3
Auto-ignition temperature	:	254 to 285°C (489.2 to 545°F)
Viscosity	:	Kinematic (room temperature): 0.03 cm^2/s (3 cSt)

Section 10. Stability and reactivity

Reactivity	:	Not expected to be Explosive, Self-Reactive, Self-Heating, or an Organic Peroxide under US GHS Definition(s).
Chemical stability	:	The product is stable.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	:	Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Trimethylbenzene, all isomers	LD50 Oral	Rat	8970 mg/kg	-
Naphthalene	LD50 Oral	Rat	490 mg/kg	-
Biphenyl	LD50 Dermal	Rabbit	>5010 mg/kg	-
	LD50 Oral	Rat	2140 mg/kg	-
Cumene	LC50 Inhalation Vapor	Mouse	10 g/m³	7 hours
	LD50 Dermal	Rabbit	12300 uL/kg	-
	LD50 Oral	Rat	2.9 g/kg	-
	LD50 Oral	Rat	4000 mg/kg	-
Xylenes, mixed isomers	LC50 Inhalation Gas.	Cat	9500 ppm	2 hours
	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6700 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6670 ppm	4 hours
	LD50 Oral	Mouse	2119 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-

Conclusion/Summary : No additional information.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Trimethylbenzene, all isomers	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
Naphthalene	Skin - Mild irritant	Rabbit	-	495 milligrams	-
Biphenyl	Eyes - Mild irritant	Rabbit	-	100 milligrams	-
	Skin - Severe irritant	Rabbit	-	24 hours 500 microliters	-
Cumene	Eyes - Mild irritant	Rabbit	-	86 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 10 milligrams	-
Xylenes, mixed isomers	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
Ethylbenzene	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-

Skin : No additional information.

Eyes : No additional information.

Respiratory : No additional information.

Sensitization

Skin : No additional information.

Respiratory : No additional information.

Mutagenicity

Conclusion/Summary : No additional information.

Carcinogenicity

Conclusion/Summary : No additional information.

Classification

Section 11. Toxicological information

Product/ingredient name	OSHA	IARC	NTP
Fuels, diesel, No 2	-	3	-
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.
Cumene	-	2B	Reasonably anticipated to be a human carcinogen.
Xylenes, mixed isomers	-	3	-
Ethylbenzene	-	2B	-

Reproductive toxicity

Conclusion/Summary : No additional information.

Teratogenicity

Conclusion/Summary : No additional information.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Trimethylbenzene, all isomers	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Biphenyl	Category 3	Not applicable.	Respiratory tract irritation
1,2,4-Trimethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
Cumene	Category 3	Not applicable.	Respiratory tract irritation
Ethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
Propylbenzene	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Trimethylbenzene, all isomers	Category 2	Not determined	central nervous system (CNS)
Ethylbenzene	Category 2	Inhalation	ears

Aspiration hazard

Name	Result
Trimethylbenzene, all isomers	ASPIRATION HAZARD - Category 1
Cumene	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1
propylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Harmful if inhaled.

Skin contact : Causes skin irritation.

Ingestion : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Section 11. Toxicological information

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Potential chronic health effects

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Trimethylbenzene, all isomers	Acute LC50 5600 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
Naphthalene	Acute EC50 1600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours
	Chronic NOEC 0.67 ppm Fresh water	Fish - Oncorhynchus kisutch	40 days
Biphenyl	Acute LC50 360 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 1450 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 0.17 mg/l Fresh water	Daphnia - Daphnia magna - Neonate	21 days
	Chronic NOEC 0.229 mg/l Fresh water	Fish - Oncorhynchus mykiss	87 days
Cumene	Acute EC50 2600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 7400 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 10600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2700 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
Xylenes, mixed isomers	Acute EC50 90 mg/l Fresh water	Crustaceans - Cypris subglobosa	48 hours
	Acute LC50 8.5 ppm Marine water	Crustaceans - Palaemonetes pugio - Adult	48 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 15700 µg/l Fresh water	Fish - Lepomis macrochirus - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	Acute LC50 19000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute LC50 16940 µg/l Fresh water	Fish - Carassius auratus	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours

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Section 12. Ecological information

	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours

Conclusion/Summary : Not available.

Persistence and degradability

Not available.

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Fuels, diesel, No 2	>3.3	-	low
Trimethylbenzene, all isomers	3.4 to 3.8	-	low
Naphthalene	3.4	36.5 to 168	low
Biphenyl	4.008	1900	high
Cumene	3.55	94.69	low
Xylenes, mixed isomers	3.12	8.1 to 25.9	low
Ethylbenzene	3.6	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA classification : D001, D018

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	NA1993	UN 1202	UN 1202
UN proper shipping name	NA 1993, Diesel Fuel, 3, PG III	UN 1202, Diesel Fuel, 3, PG III	UN 1202, Diesel Fuel, 3, PG III

Section 14. Transport information

Transport hazard class(es)	3	3	3
Packing group	III	III	III
Environmental hazards	No.	Yes.	No.
Additional information	**Packaging instruction** **Passenger aircraft** Quantity limitation: 60 L Packaging instructions: Y309 **Cargo aircraft** Quantity limitation: 220 L Packaging instructions: 310 **Remarks** 49 CFR 173.150 (f)(1) states that a flammable liquid with a flash point at or above 38ºC (100ºF) that does not meet the definition of any other hazard class may be reclassed as a combustible liquid. This provision does not apply to transportation by vessel or aircraft except where other means of transportaion is impracticable.	-	**Cargo Aircraft Only**Quantity limitation: 220 L Packaging instructions: 310 **Limited Quantities - Passenger Aircraft**Quantity limitation: 60 L Packaging instructions: 309Y

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.

Clean Water Act (CWA) 307: Ethylbenzene; Naphthalene; Toluene; Benzene

Clean Water Act (CWA) 311: Ethylbenzene; Xylenes, mixed isomers; Naphthalene; Toluene; Benzene

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.

SARA 302/304

Composition/information on ingredients

SARA 304 RQ : Not applicable.

Section 15. Regulatory information

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Fuels, diesel, No 2	Yes.	No.	No.	Yes.	Yes.
Trimethylbenzene, all isomers	Yes.	No.	No.	Yes.	Yes.
Naphthalene	Yes.	No.	No.	Yes.	Yes.
Biphenyl	No.	No.	No.	Yes.	No.
Cumene	Yes.	No.	No.	Yes.	Yes.
Xylenes, mixed isomers	Yes.	No.	No.	Yes.	Yes.
Ethylbenzene	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Naphthalene Ethylbenzene	91-20-3 100-41-4	<1 <1
Supplier notification	Naphthalene Ethylbenzene	91-20-3 100-41-4	<1 <1

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Trimethylbenzene, all isomers; Ethyltoluene

New York : The following components are listed: Ethylbenzene; Cumene; Benzene, 1-methylethyl-; Naphthalene

New Jersey : The following components are listed: Ethylbenzene; Cumene; NAPHTHALENE; TRIMETHYL BENZENE (mixed isomers); BENZENE, TRIMETHYL-; ETHYLTOLUENES; BENZENE, ETHYLMETHYL-

Pennsylvania : The following components are listed: Ethylbenzene; Cumene; NAPHTHALENE; Trimethylbenzene, all isomers; Ethyltoluene

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name	%	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Naphthalene	<1	Yes.	No.	Yes.	No.
Cumene	<1	Yes.	No.	No.	No.
Ethylbenzene	<1	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Diesel exhaust particulate	<1	Yes.	No.	No.	No.
Toluene	<0.1	No.	Yes.	No.	7000 µg/day (ingestion)
Benzene	<0.1	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)

International regulations

Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.

Canada inventory : All components are listed or exempted.

EU Inventory : All components are listed or exempted.

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).

Section 16. Other information

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of issue/Date of revision : 3/26/2015.

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

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Section 16. Other information

PRODUCT.

CITGO is a registered trademark of CITGO Petroleum Corporation

Safety Data Sheet

Material Name: Gasoline All Grades **SDS No. 9950**
US GHS

Synonyms: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquid - Category 2
Skin Corrosion/Irritation - Category 2
Germ Cell Mutagenicity - Category 1B
Carcinogenicity - Category 1B
Toxic to Reproduction - Category 1A
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Specific Target Organ Toxicity (Repeat Exposure) - Category 1 (liver, kidneys, bladder, blood, bone marrow, nervous system)
Aspiration Hazard - Category 1
Hazardous to the Aquatic Environment – Acute Hazard - Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

DANGER

Hazard Statements

Highly flammable liquid and vapour.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs (liver, kidneys, bladder, blood, bone marrow, nervous system) through prolonged or repeated exposure.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe mist/vapours/spray.
Use only outdoors or in well-ventilated area.
Do not eat, drink or smoke when using this product.
Avoid release to the environment.

Response

In case of fire: Use water spray, fog, dry chemical fire extinguishers or hand held fire extinguisher.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash before reuse. If skin irritation occurs, get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.
Get medical advice/attention if you feel unwell.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting.

Storage

Store in a well-ventilated place.
Keep cool. Keep container tightly closed.
Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
86290-81-5	Gasoline, motor fuel	100
108-88-3	Toluene	1-25
106-97-8	Butane	<10
1330-20-7	Xylenes (o-, m-, p- isomers)	1-15
95-63-6	Benzene, 1,2,4-trimethyl-	<6
64-17-5	Ethyl alcohol	0-10
100-41-4	Ethylbenzene	<3
71-43-2	Benzene	0.1-4.9

110-54-3	Hexane	0.5-4

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO_2, water spray, fire fighting foam, or gaseous extinguishing agent.
LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

USE ONLY AS A MOTOR FUEL.
DO NOT SIPHON BY MOUTH

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Gasoline, motor fuel (86290-81-5)

ACGIH: 300 ppm TWA
500 ppm STEL

Toluene (108-88-3)

ACGIH: 20 ppm TWA
OSHA: 200 ppm TWA; 375 mg/m3 TWA
150 ppm STEL; 560 mg/m3 STEL
NIOSH: 100 ppm TWA; 375 mg/m3 TWA
150 ppm STEL; 560 mg/m3 STEL

Butane (106-97-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)
OSHA: 800 ppm TWA; 1900 mg/m3 TWA
NIOSH: 800 ppm TWA; 1900 mg/m3 TWA

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: 100 ppm TWA
150 ppm STEL
OSHA: 100 ppm TWA; 435 mg/m3 TWA
150 ppm STEL; 655 mg/m3 STEL

Benzene, 1,2,4-trimethyl- (95-63-6)

NIOSH: 25 ppm TWA; 125 mg/m3 TWA

Ethyl alcohol (64-17-5)

ACGIH: 1000 ppm STEL
OSHA: 1000 ppm TWA; 1900 mg/m3 TWA
NIOSH: 1000 ppm TWA; 1900 mg/m3 TWA

Ethylbenzene (100-41-4)

ACGIH: 20 ppm TWA
OSHA: 100 ppm TWA; 435 mg/m3 TWA
125 ppm STEL; 545 mg/m3 STEL
NIOSH: 100 ppm TWA; 435 mg/m3 TWA
125 ppm STEL; 545 mg/m3 STEL

Benzene (71-43-2)

ACGIH: 0.5 ppm TWA
2.5 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH: 0.1 ppm TWA
1 ppm STEL

Hexane (110-54-3)

ACGIH: 50 ppm TWA
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 500 ppm TWA; 1800 mg/m3 TWA
NIOSH: 50 ppm TWA; 180 mg/m3 TWA

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Translucent, straw-colored or light yellow	**Odor:**	Strong, characteristic aromatic hydrocarbon odor. Sweet-ether like
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)	**Vapor Density:**	AP 3-4
Boiling Point:	85-437 °F (39-200 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible to Slight	**Specific Gravity:**	0.70-0.78
Evaporation Rate:	10-11	**VOC:**	ND
Percent Volatile:	100%	**Octanol/H2O Coeff.:**	ND
Flash Point:	-45 °F (-43 °C)	**Flash Point Method:**	PMCC
Upper Flammability Limit (UFL):	7.6%	**Lower Flammability Limit (LFL):**	1.4%
Burning Rate:	ND	**Auto Ignition:**	>530°F (>280°C)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Gasoline, motor fuel (86290-81-5)

Inhalation LC50 Rat >5.2 mg/L 4 h; Oral LD50 Rat 14000 mg/kg; Dermal LD50 Rabbit >2000 mg/kg

Toluene (108-88-3)

Inhalation LC50 Rat 12.5 mg/L 4 h; Inhalation LC50 Rat >26700 ppm 1 h; Oral LD50 Rat 636 mg/kg; Dermal LD50 Rabbit 8390 mg/kg; Dermal LD50 Rat 12124 mg/kg

Butane (106-97-8)

Inhalation LC50 Rat 658 mg/L 4 h

Xylenes (o-, m-, p- isomers) (1330-20-7)
Inhalation LC50 Rat 5000 ppm 4 h; Inhalation LC50 Rat 47635 mg/L 4 h; Oral LD50 Rat 4300 mg/kg; Dermal LD50 Rabbit >1700 mg/kg

Benzene, 1,2,4-trimethyl- (95-63-6)
Inhalation LC50 Rat 18 g/m3 4 h; Oral LD50 Rat 3400 mg/kg; Dermal LD50 Rabbit >3160 mg/kg

Ethyl alcohol (64-17-5)
Oral LD50 Rat 7060 mg/kg; Inhalation LC50 Rat 124.7 mg/L 4 h

Ethylbenzene (100-41-4)
Inhalation LC50 Rat 17.2 mg/L 4 h; Oral LD50 Rat 3500 mg/kg; Dermal LD50 Rabbit 15354 mg/kg

Benzene (71-43-2)
Inhalation LC50 Rat 13050-14380 ppm 4 h; Oral LD50 Rat 1800 mg/kg

Hexane (110-54-3)
Inhalation LC50 Rat 48000 ppm 4 h; Oral LD50 Rat 25 g/kg; Dermal LD50 Rabbit 3000 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Moderate irritant. Contact with liquid or vapor may cause irritation.

Potential Health Effects: Ingestion

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This product may cause genetic defects.

Carcinogenicity

A: General Product Information

May cause cancer.

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

B: Component Carcinogenicity

Gasoline, motor fuel (86290-81-5)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

Toluene (108-88-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71 [1999]; Monograph 47 [1989] (Group 3 (not classifiable))

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71 [1999]; Monograph 47 [1989] (Group 3 (not classifiable))

Ethyl alcohol (64-17-5)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
IARC: Monograph 100E [in preparation] (in alcoholic beverages); Monograph 96 [2010] (in alcoholic beverages) (Group 1 (carcinogenic to humans))

Ethylbenzene (100-41-4)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
IARC: Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))

Benzene (71-43-2)

ACGIH: A1 - Confirmed Human Carcinogen
OSHA: 5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH: potential occupational carcinogen
NTP: Known Human Carcinogen (Select Carcinogen)
IARC: Monograph 100F [in preparation]; Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Reproductive Toxicity

This product is suspected of damaging fertility or the unborn child.

Specified Target Organ General Toxicity: Single Exposure

This product may cause drowsiness or dizziness.

Specified Target Organ General Toxicity: Repeated Exposure

This product causes damage to organs through prolonged or repeated exposure.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Very toxic to aquatic life with long lasting effects. Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Gasoline, motor fuel (86290-81-5)

Test & Species		Conditions
96 Hr LC50 Alburnus alburnus	119 mg/L [static]	
96 Hr LC50 Cyprinodon variegatus	82 mg/L [static]	
72 Hr EC50 Pseudokirchneriella subcapitata	56 mg/L	
24 Hr EC50 Daphnia magna	170 mg/L	

Toluene (108-88-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	15.22-19.05 mg/L [flow-through]	1 day old
96 Hr LC50 Pimephales promelas	12.6 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	5.89-7.81 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	14.1-17.16 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	5.8 mg/L [semi-static]	
96 Hr LC50 Lepomis macrochirus	11.0-15.0 mg/L [static]	
96 Hr LC50 Oryzias latipes	54 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.2 mg/L [semi-static]	
96 Hr LC50 Poecilia reticulata	50.87-70.34 mg/L [static]	
96 Hr EC50 Pseudokirchneriella subcapitata	>433 mg/L	
72 Hr EC50 Pseudokirchneriella subcapitata	12.5 mg/L [static]	
48 Hr EC50 Daphnia magna	5.46 - 9.83 mg/L [Static]	
48 Hr EC50 Daphnia magna	11.5 mg/L	

Xylenes (o-, m-, p- isomers) (1330-20-7)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	13.4 mg/L [flow-through]	

96 Hr LC50 Oncorhynchus mykiss	2.661-4.093 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	13.5-17.3 mg/L	
96 Hr LC50 Lepomis macrochirus	13.1-16.5 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	19 mg/L	
96 Hr LC50 Lepomis macrochirus	7.711-9.591 mg/L [static]	
96 Hr LC50 Pimephales promelas	23.53-29.97 mg/L [static]	
96 Hr LC50 Cyprinus carpio	780 mg/L [semi-static]	
96 Hr LC50 Cyprinus carpio	>780 mg/L	
96 Hr LC50 Poecilia reticulata	30.26-40.75 mg/L [static]	
48 Hr EC50 water flea	3.82 mg/L	
48 Hr LC50 Gammarus lacustris	0.6 mg/L	

Benzene, 1,2,4-trimethyl- (95-63-6)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	7.19-8.28 mg/L [flow-through]	
48 Hr EC50 Daphnia magna	6.14 mg/L	

Ethyl alcohol (64-17-5)

Test & Species		Conditions
96 Hr LC50 Oncorhynchus mykiss	12.0 - 16.0 mL/L [static]	
96 Hr LC50 Pimephales promelas	>100 mg/L [static]	
96 Hr LC50 Pimephales promelas	13400 - 15100 mg/L [flow-through]	
48 Hr LC50 Daphnia magna	9268 - 14221 mg/L	
24 Hr EC50 Daphnia magna	10800 mg/L	
48 Hr EC50 Daphnia magna	2 mg/L [Static]	

Ethylbenzene (100-41-4)

Test & Species		Conditions
96 Hr LC50 Oncorhynchus mykiss	11.0-18.0 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	4.2 mg/L [semi-static]	
96 Hr LC50 Pimephales promelas	7.55-11 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	32 mg/L [static]	
96 Hr LC50 Pimephales promelas	9.1-15.6 mg/L [static]	
96 Hr LC50 Poecilia reticulata	9.6 mg/L [static]	
72 Hr EC50 Pseudokirchneriella subcapitata	4.6 mg/L	
96 Hr EC50 Pseudokirchneriella subcapitata	>438 mg/L	
72 Hr EC50 Pseudokirchneriella subcapitata	2.6 - 11.3 mg/L [static]	

96 Hr EC50 Pseudokirchneriella subcapitata	1.7 - 7.6 mg/L [static]
48 Hr EC50 Daphnia magna	1.8 - 2.4 mg/L

Benzene (71-43-2)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	10.7-14.7 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	22.49 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]	
96 Hr LC50 Pimephales promelas	22330-41160 µg/L [static]	
96 Hr LC50 Lepomis macrochirus	70000-142000 µg/L [static]	
72 Hr EC50 Pseudokirchneriella subcapitata	29 mg/L	
48 Hr EC50 Daphnia magna	8.76 - 15.6 mg/L [Static]	
48 Hr EC50 Daphnia magna	10 mg/L	

Hexane (110-54-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	2.1-2.98 mg/L [flow-through]	
24 Hr EC50 Daphnia magna	>1000 mg/L	

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Gasoline, motor fuel	86290-81-5	DOT regulated marine pollutant

DOT Information

Shipping Name: Gasoline
UN #: 1203 **Hazard Class:** 3 **Packing Group:** II
Placard:

* * * Section 15 - Regulatory Information * * *

Regulatory Information

A: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Toluene (108-88-3)
SARA 313: 1.0 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Xylenes (o-, m-, p- isomers) (1330-20-7)
SARA 313: 1.0 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Benzene, 1,2,4-trimethyl- (95-63-6)
SARA 313: 1.0 % de minimis concentration

Ethylbenzene (100-41-4)
SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Benzene (71-43-2)
SARA 313: 0.1 % de minimis concentration
CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

Hexane (110-54-3)

SARA 313: 1.0 % de minimis concentration
CERCLA: 5000 lb final RQ; 2270 kg final RQ

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	X	--	--

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Gasoline, motor fuel	86290-81-5	DOT regulated marine pollutant

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Gasoline, motor fuel	86290-81-5	No	No	No	No	Yes	No
Toluene	108-88-3	Yes	Yes	Yes	Yes	Yes	No
Butane	106-97-8	Yes	Yes	Yes	Yes	Yes	No
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	Yes	Yes	Yes	Yes	No
Benzene, 1,2,4-trimethyl-	95-63-6	No	Yes	Yes	Yes	Yes	No
Ethyl alcohol	64-17-5	Yes	Yes	Yes	Yes	Yes	No
Ethylbenzene	100-41-4	Yes	Yes	Yes	Yes	Yes	No
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	No
Hexane	110-54-3	No	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Toluene	108-88-3	1 %
Butane	106-97-8	1 %
Benzene, 1,2,4-trimethyl-	95-63-6	0.1 %
Ethyl alcohol	64-17-5	0.1 %
Ethylbenzene	100-41-4	0.1 %
Benzene	71-43-2	0.1 %
Hexane	110-54-3	1 %

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Gasoline, motor fuel	86290-81-5	No	DSL	EINECS
Toluene	108-88-3	Yes	DSL	EINECS
Butane	106-97-8	Yes	DSL	EINECS
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	DSL	EINECS
Benzene, 1,2,4-trimethyl-	95-63-6	Yes	DSL	EINECS
Ethyl alcohol	64-17-5	Yes	DSL	EINECS
Ethylbenzene	100-41-4	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS
Hexane	110-54-3	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	2
Fire	3
Reactivity	0

HMIS® Hazard Rating

Health	2	Moderate
Fire	3	Serious
Physical	0	Minimal
		*Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

MATERIAL SAFETY DATA SHEET (MSDS) FOR PORTLAND CEMENT

(Complies with OSHA and MSHA Hazard Communication Standards,
29 CFR 1910.1200and 30 CFR Part 47)

CEMEX, INC.
CEMEX CALIFORNIA CEMENT LLC
VICTORVILLE CEMENT PLANT
16888 NORTH "E" STREET
VICTORVILLE, CALIFORNIA 92394-2999

Section 1 - IDENTIFICATION

Supplier/Manufacturer

CEMEX, Inc.
CEMEX California Cement LLC
Victorville Cement Plant
16888 North "E" Street
Victorville, California 92394-2999

Emergency Contact Information

(619) 381-7600

Chemical name and synonyms

Portland Cement (CAS #65997-15-1)

Product name

"CEMEX Type I/II"
"CEMEX Type III"
"CEMEX Type II/V"
"CEMEX Type V"
"CEMEX Block"
"CEMEX Class G"

Chemical family

Calcium salts.

Formula

$3CaO.SiO_2$	(CAS #12168-85-3)
$2CaO.SiO_2$	(CAS #10034-77-2)
$3CaO.Al_2O_2$	(CAS #12042-78-3)
$4CaO..Al_2O_3Fe_2O_3$	(CAS #12068-35-8)
$CaSO_2.2H_2O$	(CAS #13397-24-5)

Other salts: Small amounts of MgO, and trace amounts of K_2SO_4 and Na_2SO_4 may also be present.

Section 2 - COMPONENTS

Hazardous Ingredients

Portland cement clinker (CAS# 65997-15- 1) - approximately - 93.5-96.0 % by weight
ACGIH TLV-TWA (2000) = 10 mg total dust/m^3
OSHA PEL (8-hour TWA) = 50 million particles/ft^3

Gypsum (CAS# 7778-18-9) - approximately - 4.0-6.5 % by weight
ACGIH TLV-TWA (2000) = 10 mg total dust/m^3
OSHA PEL (8-hour TWA) = 15 mg total dust/m^3
OSHA PEL (8-hour TWA) = 5 mg respirable dust/m^3

Respirable quartz (CAS# 14808-60-7) – greater than 0.1% by weight
ACGIH TLV-TWA (2000) = 0.05 mg respirable quartz dust/m^3
OSHA PEL (8-hour TWA) = (10 mg respirable dust/$m^{3)}$/(percent silica + 2)

Trace Ingredients

Trace amounts of naturally occurring chemicals might be detected during chemical analysis. Trace constituents may include up to 0.75% insoluble residue, some of which may be free crystalline silica, calcium oxide (Also known as lime or quick lime), magnesium oxide, potassium sulfate, sodium sulfate, chromium compounds, and nickel compounds.

Section 3 - HAZARD IDENTIFICATION

Emergency Overview

Portland cement is a light gray powder that poses little immediate hazard. A single short-term exposure to the dry powder is not likely to cause serious harm. However, exposure of sufficient duration to wet portland cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry portland cement.

Potential Health Effects

Relevant Routes of Exposure:
Eye contact, skin contact, inhalation, and ingestion.

Effects Resulting from Eye Contact:
Exposure to airborne dust may cause immediate or delayed irritation or inflammation. Eye contact by large amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns or blindness. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

Effects Resulting from Skin Contact:
Discomfort or pain cannot be relied upon to alert a person to hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly with wet cement. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Dry portland cement contacting wet skin or exposure to moist or wet portland cement may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (alkali) chemical burns.

Some individuals may exhibit an allergic response upon exposure to portland cement, possibly due to trace elements of chromium. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may first experience this effect after years of contact with portland cement products.

Effects Resulting from Inhalation:
Portland cement may contain trace amounts of free crystalline silica. Prolonged exposure to respirable free silica can aggravate other lung conditions and cause silicosis, a disabling and potentially fatal lung disease.

Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

Effects Resulting from Ingestion:
Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Portland cement should not be eaten.

Carcinogenic potential:
Portland cement is **not** listed as a carcinogen by NTP, OSHA, or IARC. It may however, contain trace amounts of substances listed as carcinogens by these organizations.

Crystalline silica, a potential trace level contaminate in Portland cement, is now classified by IARC as known human carcinogen (Group I). NTP has characterized respirable silica as "reasonably anticipated to be [a] carcinogen".

Medical conditions which may be aggravated be, inhalation or dermal exposure:
Pre-existing upper respiratory and lung diseases.
Unusual (hyper) sensitivity to hexavalent chromium (chromium^{+6}) salts.

Section 4 - FIRST AID

Eyes

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin

Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment in all cases of prolonged exposure to wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to dry cement.

Inhalation of Airborne Dust

Remove to fresh air. Seek medical help if coughing and other symptoms do not subside.

Ingestion

Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

Section 5 - FIRE AND EXPLOSION DATA

Flash point .....None
Lower Explosive Limit.....None
Upper Explosive Limit.....None
Auto ignition temperature.....Not Combustible
Extinguishing media.....Not Combustible
Special fire fighting Procedures.....None
Hazardous combustion products.....None
Unusual fire and explosion hazards...None

Section 6 - ACCIDENTAL RELEASE MEASURES

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section 8.

Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash portland cement down drains.

Dispose of waste material according to local, state and federal regulations.

Section 7 - HANDLING AND STORAGE

Keep portland cement dry until used. Normal temperatures and pressures do not affect the material.

Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids.

Section 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Skin Protection

Prevention is essential to avoiding potentially severe skin injury. Avoid contact with unhardened portland cement. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to unhardened portland cement products might occur, wear impervious clothing and gloves to eliminate skin contact. Wear sturdy boots that are impervious to water to eliminate foot and ankle exposure.

Do not rely on barrier creams: barrier creams should not be used in place of gloves.

Periodically wash areas contacted by dry portland cement or by wet cement or concrete fluids with a pH neutral soap. Wash again at the end of work. If irritation occurs, immediately wash the affected area and seek treatment. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean dry clothing.

Respiratory Protection

Avoid actions that cause dust to become airborne. Use local or general exhaust ventilation to control exposures below applicable exposure limits.

Use NIOSH/MSHA approved (under 30 CFR 11) or NIOSH approved (under 42 CFR 84) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation. (Advisory: Respirators and filters purchased after June 10, 1998 must be certified under 42 CFR 84.)

Ventilation

Use local exhaust or general dilution ventilation to control exposure within applicable limits.

Eye Protection

Where potentially subject to splashes or puffs of cement, wear safety glasses with side shields or goggles. In extremely dusty environments and unpredictable environments wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with portland cement or fresh cement products.

Section 9 - PHYSICAL AND CHEMICAL, PROPERTIES

Appearance.....Gray Powder
Physical state.....Solid (powder)
Solubility in water...Slightly soluble (0.1 to 1.0%)
Vapor density.....Not applicable
Melting point.....Not applicable
Evaporation rate.....Not applicable

Odor.....No distinct odor
pH (in water).....12 to 13
Vapor pressure.....Not applicable
Boiling point.....Not applicable (i.e., > 1000 C)
Specific gravity (H20 = 1.0).....3.15

Section 10 - STABILITY AND REACTIVITY

Stability

Stable.

Conditions to avoid

Unintentional contact with water.

Incompatibility

Wet Portland cement is alkaline. As such it is incompatible with acids, ammonium salts and phosphorous.

Hazardous decomposition

Will not spontaneously occur. Adding water produces (caustic) calcium hydroxide

Hazardous Polymerization

Will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

For a description of available, more detailed toxicological information contact the supplier or manufacturer.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity

No recognized unusual toxicity to plants or animals

Relevant physical and chemical properties

(See Sections 9 and 10.)

Section 13 - DISPOSAL

Dispose of waste material according to local, state and federal regulations. (Since portland cement is stable, uncontaminated material may be saved for future use.

Dispose of bags in an approved landfill or incinerator.

Section 14 - TRANSPORTATION DATA

Hazardous materials description/proper shipping name

Portland is cement is not hazardous under U.S. Department of Transportation (DOT) regulations.

Hazard class

Not applicable

Identification number

Not applicable.

Required label text

Not applicable.

Hazardous substances/reportable quantities (RQ)

Not applicable.

Section 15 - OTHER REGULATORY INFORMATION

Status under USDOL-OSHA Hazard Communication Rule, 29 CFR 1910.1200

Portland cement is considered a "hazardous chemical" under this regulation, and should be part of any hazard communication program.

Status under CERCLA/SUPERFUND 40 CFR 117 and 302

Not listed.

Hazard Category under SARA(Title III), Sections 311 and 312

Portland cement qualifies as a "hazardous substance" with delayed health effects.

Status under SARA (Title III), Section 313

Not subject to reporting requirements under Section 313.

Status under TSCA (as of May 1997)

Some substances in portland cement are on the TSCA inventory list.

Status under the Federal Hazardous Substances Act

Portland cement is a "hazardous substance" subject to statutes promulgated under the subject act.

Status under California Proposition 65

This product contains up to 0.05 percent of chemicals (trace elements) known to the State of California to cause cancer, birth defects or other reproductive harm. California law requires the manufacturer to give the above warning in the absence of definitive testing to prove that the defined risks do not exist.

Section 16 - OTHER INFORMATION

Prepared by

Kevin Keegan
Director - Health and Safety
CEMEX, Inc.
Houston, Texas

Approval date or Revision date

Approved: August, 1997
Revised: March, 2001

Other important information

Portland cement should only be used by knowledgeable persons. A key to using the product safely requires the user to recognize that portland cement chemically reacts with water, and that some of the intermediate products of this reaction (that is those present while a portland cement product is "setting") pose a more severe hazard than does dry portland cement itself.

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot anticipate and provide the all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY CEMEX, Inc. except that the product shall conform to contracted specifications. The information provided herein was believed by CEMEX, Inc. to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for non-delivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with portland cement to produce portland cement products. Users should review other relevant material safety data sheets before working with this portland cement or working on portland cement products, for example, portland cement concrete.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Lubricating Oil FM 32, 46, 68

Product Use: Industrial Oil
Product Number(s): CPS232103, CPS255110, CPS255150
Company Identification
Chevron Products Company
a division of Chevron U.S.A. Inc.
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@chevron.com
Product Information: (800) LUBE TEK

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
White mineral oil	8042-47-5	90 - 100 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory

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irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).
FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 192 °C (378 °F) Minimum
Autoignition: No data available
Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

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Reporting: Report spills to local authorities as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Neoprene, Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required. If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

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Occupational Exposure Limits:

Component	Country/ Agency	TWA	STEL	Ceiling	Notation
White mineral oil	ACGIH	5 mg/m3	10 mg/m3	--	--

Consult local authorities for appropriate values.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315°C (599°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Density: 0.867 kg/l @ 15.6°C (60.1°F) (Typical)
Viscosity: 61.2 cSt @ 40°C (104°F) Minimum
Evaporation Rate: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
This material is not expected to be harmful to aquatic organisms. The ecotoxicity hazard is based on an evaluation of data for the components or a similar material.

ENVIRONMENTAL FATE
Ready Biodegradability: This material is not expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO TI OR IATA DGR

SECTION 15 REGULATORY INFORMATION

REGULATORY LISTS SEARCHED:
01-1=IARC Group 1
01-2A=IARC Group 2A
01-2B=IARC Group 2B

The following components of this material are found on the regulatory lists indicated.
White mineral oil 01-1

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

EU RISK AND SAFETY PHRASES: S61: Avoid release to the environment. Refer to special instructions/Safety data sheets.

WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled

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Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 0 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : INDUSTRIAL OIL 1 - IND1

REVISION STATEMENT: This is a new Material Safety Data Sheet.
Revision Date: OCTOBER 28, 2010

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the International Standard (ISO 11014-1) & (NBR 14725) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 04.05.2015 Revision: 04.05.2015

SECTION 1: Identification of the substance/mixture and of the company/ undertaking

· **1.1 Product identifier**

· **Trade name:** **Super Lube® Multi-Purpose Grease W/PTFE**

· **Article number:** No other identifiers

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.

· **Application of the substance / the mixture** Lubricant

· **1.3 Details of the supplier of the Safety Data Sheet**

· **Manufacturer/Supplier:**
Synco Chemical Corporation
24 DaVinci Dr., P.O. Box 405
Bohemia, NY 11716

Telephone: 631-567-5300

· **1.4 Emergency telephone number:**
CHEMTREC
1-800-424-9300 (US/Canada)
+01 703-527-3887 (International)

SECTION 2: Hazards identification

· **2.1 Classification of the substance or mixture**

· **Classification according to Regulation (EC) No 1272/2008**
The product is not classified as hazardous according to OSHA GHS regulations within the United States.
The product is not classified as hazardous according to the CLP regulation.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC** Not applicable.

· **Information concerning particular hazards for human and environment:**
The product does not have to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

· **Additional information:**
0 percent of the mixture consists of component(s) of unknown toxicity
There are no other hazards not otherwise classified that have been identified.

· **2.2 Label elements**

· **Labelling according to Regulation (EC) No 1272/2008**
The product is not classified as hazardous according to OSHA GHS regulations within the United States.
This product does not have a classification according to the CLP regulation.

· **Hazard pictograms** Not Regulated

· **Signal word** Not Regulated

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· **Hazard-determining components of labelling:** None.
· **Hazard statements** Not Regulated
· **Precautionary statements** Not Regulated
· **Additional information:**
EUH210 Safety data sheet available on request.
· **Hazard description:**
· **WHMIS-symbols:** Not hazardous under WHMIS.
· **NFPA ratings (scale 0 - 4)**

Health = 0
Fire = 1
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 0
Fire = 1
Reactivity = 0

· **HMIS Long Term Health Hazard Substances**
None of the ingredients are listed.

· **2.3 Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

SECTION 3: Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:** None in reportable quantities.
· **Additional information:**
For the wording of the listed risk phrases refer to section 16.
For the listed ingredients, the identity and exact percentages are being withheld as a trade secret.

SECTION 4: First aid measures

· **4.1 Description of first aid measures**
· **General information:** No special measures required.
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation is experienced, consult a doctor.
· **After eye contact:**
Rinse opened eye for several minutes under running water.
Remove contact lenses if worn.

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Seek medical treatment in case of complaints.
· **After swallowing:**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.
· **4.2 Most important symptoms and effects, both acute and delayed**
May cause gastro-intestinal irritation if ingested.
Acne
· **Hazards** No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

SECTION 5: Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:** Use fire extinguishing methods suitable to surrounding conditions.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **5.2 Special hazards arising from the substance or mixture**
Formation of toxic gases is possible during heating or in case of fire.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.
· **Additional information** No further relevant information available.

SECTION 6: Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Ensure adequate ventilation
Particular danger of slipping on leaked/spilled product.
· **6.2 Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Pick up mechanically.
Dispose contaminated material as waste according to item 13.
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

· **7.1 Precautions for safe handling** Store away from oxidising agents.
· **Information about fire - and explosion protection:** No special measures required.

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· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Avoid storage near extreme heat, ignition sources or open flame.
· **Information about storage in one common storage facility:**
Store away from foodstuffs.
Do not store together with oxidising and acidic materials.
· **Further information about storage conditions:** None.
· **7.3 Specific end use(s)** No further relevant information available.

SECTION 8: Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

· **8.1 Control parameters**
· **Ingredients with limit values that require monitoring at the workplace:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
· **DNELs** No further relevant information available.
· **PNECs** No further relevant information available.
· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
The usual precautionary measures are to be adhered to when handling chemicals.
Keep away from foodstuffs, beverages and feed.
Avoid contact with the eyes and skin.
· **Respiratory protection:** Not required under normal conditions of use.
· **Protection of hands:**
Gloves not required under normal conditions of use.
Wear protective gloves to handle contents of damaged or leaking units.
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Safety glasses

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· **Body protection:** Not required under normal conditions of use.
· **Limitation and supervision of exposure into the environment** No special requirements.
· **Risk management measures** No special requirements.

SECTION 9: Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

Form:	Semi-solid
Colour:	Translucent
· **Odour:**	Mild
· **Odour threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	Not Determined.
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	>220 °C (>428 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Auto/Self-ignition temperature:**	Not determined.
· **Decomposition temperature:**	Not determined.
· **Self-igniting:**	Product is not self-igniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapour pressure:**	Not determined.
· **Density at 20 °C (68 °F):**	0,89 g/cm³ (7,427 lbs/gal)
· **Relative density**	Not determined.
· **Vapour density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with water:**	Not miscible or difficult to mix.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not determined.
Kinematic:	Not determined.

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· **9.2 Other information** No further relevant information available.

SECTION 10: Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
· **10.3 Possibility of hazardous reactions** Reacts with strong acids and oxidising agents.
· **10.4 Conditions to avoid**
Avoid acids.
Excessive heat.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:** Carbon monoxide and carbon dioxide

SECTION 11: Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **LD/LC50 values relevant for classification:** None.
· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitisation:** No sensitising effects known.
· **Subacute to chronic toxicity:** No further relevant information available.
· **Additional toxicological information:**
The product is not subject to classification according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version.
When used and handled according to specifications, the product does not have any harmful effects to our experience and the information provided to us.
May cause acne.
· **Repeated dose toxicity:** No further relevant information available.
· **CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):** See Section 15.

SECTION 12: Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability** The product is partially biodegradable. Significant residuals remain.
· **12.3 Bioaccumulative potential** No further relevant information available.
· **12.4 Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

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Avoid transfer into the environment.
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water

· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **12.6 Other adverse effects** No further relevant information available.

SECTION 13: Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Smaller quantities can be disposed of with household waste.
Can be burned with household garbage after consulting with the waste disposal facility operator and the pertinent authorities and adhering to the necessary technical regulations.
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.

SECTION 14: Transport information

· **14.1 UN-Number**	
· **DOT, ADR, ADN, IMDG, IATA**	Not Regulated
· **14.2 UN proper shipping name**	
· **DOT, ADR, ADN, IMDG, IATA**	Not Regulated
· **14.3 Transport hazard class(es)**	
· **DOT, ADR, ADN, IMDG, IATA**	
· **Class**	Not Regulated
· **14.4 Packing group**	
· **DOT, ADR, IMDG, IATA**	Not Regulated
· **14.5 Environmental hazards:**	
· **Marine pollutant:**	No
· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **UN "Model Regulation":**	-

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according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 04.05.2015 Revision: 04.05.2015

Trade name: Super Lube® Multi-Purpose Grease W/PTFE

(Contd. of page 7)

SECTION 15: Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients are listed.

· **Section 313 (Specific toxic chemical listings):**
None of the ingredients are listed.

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**
None of the ingredients are listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients are listed.

· **IARC (International Agency for Research on Cancer)**

9002-84-0	Polytetrafluoroethylene	3

· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients are listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients are listed.

· **Canada**

· **Canadian Domestic Substances List (DSL)**
All ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**
None of the ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 1%)**
None of the ingredients are listed.

· **Other regulations, limitations and prohibitive regulations**
This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

(Contd. on page 9)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 04.05.2015 Revision: 04.05.2015

Trade name: Super Lube® Multi-Purpose Grease W/PTFE

(Contd. of page 8)

· **Substances of very high concern (SVHC) according to REACH, Article 57**

None of the ingredients are listed.

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

· **Sources**

SDS Prepared by:
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Attachment 6
Activity Hazard Analyses

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-01 Mobilization and Site Preparation	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Mobilize Personnel and Equipment: Coordinate with base personnel for mobilization and site preparation. Obtain security clearance for personnel. Attend pre-construction meeting. Conduct safety orientation briefing. Review SSHP/AHA. Establish equipment and supply storage. Construct laydown areas for equipment and temporary facilities, if applicable.
Arrange for Other Temporary Services: Arrange for construction debris roll-off bins, portable toilets, hand wash station; trash collection, water supply, etc.
Mobilize Heavy Equipment: Receive and inspect equipment.
Perform Site Reconnaissance: Walk the site. Establish access and haul routes.
Conduct Utility Clearance: Perform/verify utility locating survey. According to the RFP, there are no utilities present at the removal action site.
Set-up Work Zones: Delineate work zones. Install orange construction fencing to delineate work areas and restricted entry areas. Install safety signage. Set up decontamination station. Establish canopy shelter in support zone for work breaks/temporary shelter.
Install Soil Erosion Controls: To prevent the release of contaminated sediment through precipitation, run-on/runoff will be controlled by use of silt fences, temporary diversion ditches, dikes, and slope drains that will be constructed, as needed. Straw bales will be placed at the perimeters of all sloped project work areas and around staging areas that handle contaminated materials.

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**

Job Steps	Hazards	Controls	RAC
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, drill rig operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Mobilize Personnel Description: Coordinate with base personnel for mobilization and site preparation. Obtain security clearance for personnel. Attend pre-construction meeting. Conduct safety orientation briefing. Review SSHP/AHA. Establish equipment and supply storage. Construct laydown areas for equipment and temporary facilities.	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Unfamiliar with Site and Requirements (unfamiliarity with site hazards, project safety rules, hazard control procedures, chain of command, and emergency procedures)	2a. All site personnel will attend a site safety orientation briefing and SSHP/AHA review conducted by the SSHO. 2b. Site personnel will sign an SSHP Review form. 2c. Provide certifications to the SSHO for review before start of field work.	**L**

Job Steps	Hazards	Controls	RAC
	3. Vehicle Traffic at Jobsite (struck by)	3a. Establish parking area for vehicles. 3b. Establish site entrance and exit routes for vehicles. 3c. Do not walk in pathways for vehicle or equipment traffic.	**L**
	4. Moving Supplies (cut, scrape, back strain)	4a. Watch for sharp edges or points on objects to be handled. Tape up or cushion as needed. 4b. Use work gloves. 4c. See safe lifting and material handling under "All Site Activities" job step.	**L**
Arrange for Other Temporary Services Description: Arrange for construction debris roll-off bins, portable toilets, hand wash station; trash collection, water supply, etc.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Vehicle Traffic by Job Trailer Area (struck by)	2a. Make sure portable toilet entrances face away from traffic areas. 2b. Make sure trash bins are situated with no equipment blind spots by the bin. 2c. Keep walking area next to job trailer free from vehicle traffic and parking. 2d. Vendors must wear required PPE. 2e. Personnel must look for traffic before walking.	**L**
	3. Moving Supplies (cut, scrape, back strain)	3a. Watch for sharp edges or points on objects to be handled. Tape up or cushion as needed. 3b. Use work gloves.	**M**
	4. Hand Tool Use (struck by; cut; pinch; puncture)	4a. Use the proper tool for the job. Do not use damaged tools. 4b. Wear work gloves that are suitable for the task to be performed (leather gloves for heavy work) and use safety glasses. 4c. Properly secure materials when working on them. 4d. Make sure your work area is clear of others who could be struck. 4e. Keep your body out of the line-of-fire.	**M**
Mobilize Heavy Equipment Description: Receive delivery of heavy equipment. Conduct initial inspection of heavy equipment.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Overhead Power Lines (electrocution)	2a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 2b. Do not operate equipment within 10-feet of overhead lines. 2c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 2d. De-energize lines and/or use engineering controls for protection as needed.	**M**
	3. Off-Loading of Heavy Equipment (struck by, crush)	3a. Keep all non-essential personnel out of the off-loading area. 3b. Maintain proper distance from heavy equipment when off-loading from trailer. 3c. Maintain eye contact with the equipment operator and indicate your movement with hand signals before approaching. 3d. Keep hands and body away from equipment when removing securing chains.	**M**

Job Steps	Hazards	Controls	RAC
	4. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	4a. Inspect heavy equipment before use. 4b. Operators must complete and submit an equipment inspection form daily. 4c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 4d. Getting off or on any equipment while it is in motion is prohibited. 4e. Maintain three points-of-contact when getting on or off equipment. 4f. The operator shall use safety belts while equipment is in use. 4g. Use spotters for backing into tight work areas. 4h. When equipment is parked, the parking brake and bucket set on the ground 4i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	5. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	5a. Ground personnel must wear ANSI Class II high-visibility safety vests. 5b. Maintain positive contact between operator and ground personnel. 5c. Do not cross the path of moving equipment. 5d. Do not walk directly behind or to the side of heavy equipment. 5e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 5f. Equipment operators must check the area before swinging a load. 5g. Keep out of the heavy equipment swing radius/operating area if possible. 5h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 5i.Do not stand below or walk underneath a suspended load.	**M**
	6. Fire Hazards (fire; burns)	6a. Portable multi-purpose fire extinguishers must be maintained on site, kept fully charged, inspected monthly, and serviced annually. 6b. Have fire extinguishers on drill rig and in active work areas. 6c. Allow smoking only in designated areas. 6d. Use proper procedures for fueling of equipment if conducted on site. 6e. No ignition sources within 50 feet of flammable/combustible material storage. 6f. Fire lanes must be provided. 6g. Use metal fire safety cans to store small amounts of flammable liquids. 6h. A spill kit with absorbent pads shall be available for spill control/response.	**M**

Job Steps	Hazards	Controls	RAC
	7. Fuel Spills (spill; fire; exposure)	7a. All spills touching the ground shall be reported immediately to the SSHO. 7b. During repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease; poly sheeting shall be placed on the ground beneath the repair location to prevent the ground from becoming contaminated from spills. 7c. A spill kit with absorbent pads shall be available for spill control/response. 7d. Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 7e. All spills no matter what size will be immediately contained as long as it doesn't endanger personnel.	**M**
Perform Site Reconnaissance Description: Walk the site. Establish access and haul routes.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
Conduct Utility Clearance Description: Perform/verify utility locating survey. According to the RFP, there are no utilities present at the removal action site.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Underground Utilities (electrocution)	2a. Perform/verify utility locate. Obtain/review utility map. 2b. Obtain a dig permit before any ground disturbance. 2d. Review and inspect utility mark-outs before drilling work. 2e. Protect utility mark-outs from damage, deterioration, or covering up with soil. 2f. If utilities are indicated in the area to be excavated, hand dig (or pot hole by air knife or water injection) two feet on either side of a marked utility to locate it. 2g. Contact the KO immediately if damage to underground utilities occurs.	**M**
	3. Moving Supplies (cut, scrape, back strain)	3a. Watch for sharp edges or points on objects to be handled. 3b. Wear work gloves when handling materials. 3c. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting.	**M**
	4. Hand Tool Use (struck by; cut; pinch; puncture)	4a. Use the proper tool for the job. Do not use damaged tools. 4b. Wear work gloves that are suitable for the task to be performed (leather gloves for heavy work) and use safety glasses. 4c. Properly secure materials when working on them. 4d. Make sure your work area is clear of others who could be struck. 4e. Keep your body out of the line-of-fire.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	5. Vehicle and Equipment Traffic (struck by)	5a. Do not walk in pathways for vehicle or equipment traffic. 5b. Personnel must look for traffic before walking. 5c. Personnel must wear ANSI Class II high-visibility safety vests.	**M**
Set-Up Work Zones Description: Delineate work zones. Install orange construction fencing to delineate work areas and restricted entry areas. Install safety signage.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use (struck by; cut; pinch; puncture)	2a. Follow hand tool use safety control procedures reviewed above.	**M**
	3. Utility Knife Use (cut)	3a. Use utility knife with blade that retracts and is covered when not in use. 3b. Cut away from the body.	**M**
Install Soil Erosion Controls Description: To prevent the release of contaminated sediment through precipitation, run-on/runoff will be controlled by use of silt fences, temporary diversion ditches, dikes, and slope drains that will be constructed, as needed. Straw bales will be placed at the perimeters of all sloped project work areas and around staging areas that handle contaminated materials.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Trencher operation (flying particles; cut; noise)	2a. Wear eye protection to protect from flying particles (e.g., rocks) 2b. Wear ear plugs to protect from noise exposure. 2c. Keep area clear behind the trencher. Do not stand or walk behind trencher. 2d. Do not place hands or other parts of body near moving parts/pinch points.	**M**
	3. Fire protection (fire hazard)	3a. Have a fire extinguisher on the trencher or near the work area. 3b. Allow smoking only in designated areas. 3c. If fueling with portable fuel can, use OSHA-approved metal fuel safety can with self-closing lid and flame arrestor.	**M**
	4. Hand tool use (struck by; cut; pinch; puncture)	4a. Follow hand tool use safety control procedures reviewed above.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Hand tools; Power tools; LO/TO equipment; Heavy equipment; Trencher; Fuel safety can; Funnel; Portable toilets; Erosion control equipment (silt fence, straw bales, etc.); Fence t-posts; Post driver; Orange construction fence; Cable ties; Baling wire; Fire extinguisher; Spill kit; First-aid kit; Eyewash	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily).

supplies; PPE.		

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-01 Mobilization and Site Preparation					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print:	11.	Print:	21.	Print:
	Sign:		Sign:		Sign:
2.	Print:	12.	Print:	22.	Print:
	Sign:		Sign:		Sign:
3.	Print:	13.	Print:	23.	Print:
	Sign:		Sign:		Sign:
4.	Print:	14.	Print:	24	Print:
	Sign:		Sign:		Sign:
5.	Print:	15.	Print:	25.	Print:
	Sign:		Sign:		Sign:
6.	Print:	16.	Print:	26.	Print:
	Sign:		Sign:		Sign:
7.	Print:	17.	Print:	27.	Print:
	Sign:		Sign:		Sign:
8.	Print:	18.	Print:	28.	Print:
	Sign:		Sign:		Sign:
9.	Print:	19.	Print:	29.	Print:
	Sign:		Sign:		Sign:
10.	Print:	20.	Print:	30.	Print:
	Sign:		Sign:		Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-02 Land Surveying	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Perform Site Surveying: Subcontractor (Commonwealth of Puerto Rico-licensed surveyor) to perform land surveying. Perform necessary site and topographic surveys. Establish initial survey controls at the site and horizontal and vertical controls. Provide construction staking of corners of the excavation areas. Perform initial topographic survey to establish existing grades. Perform final topographic survey for use in developing as-built drawings.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, dump truck operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Perform Site Surveying Description: Subcontractor (Commonwealth of Puerto Rico-licensed surveyor) to perform land surveying. Perform necessary site and topographic surveys. Establish initial survey controls at the site and horizontal and vertical controls. Provide construction staking of corners of the excavation areas. Perform initial topographic survey to establish existing grades. Perform final topographic survey for use in developing as-built drawings.	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	2a. Lead is present in the soil. The routes of exposure for lead to enter the body are by inhalation and ingestion. Primary health effects of exposure are gastrointestinal disturbances, anemia, neuromuscular dysfunction, encephalopathy, and nephropathy. 2b. Conduct lead-related work in compliance with the OSHA lead in construction standard (29 CFR 1926.62). 2c. Use dust control measures and safe work practices to minimize exposure. 2d. Ensure that workers have received lead information and training. 2e. Wear PPE as defined in the SSHP and as directed by the SSHO. 2f. Follow personnel decontamination measures when exiting exclusion zone. 2g. Perform equipment decontamination before it exits the exclusion zone. 2h. Place used PPE in a separate container that is properly labeled.	**M**
	3. Moving Supplies (cut, scrape, back strain)	3a. Watch for sharp edges or points on objects to be handled. 3b. Wear work gloves when handling materials. 3c. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	4. Hand Tool Use (struck by; cut; pinch; puncture)	4a. Use the proper tool for the job. Do not use damaged tools. 4b. Wear work gloves that are suitable for the task to be performed (leather gloves for heavy work) and use safety glasses. 4c. Properly secure materials when working on them. 4d. Make sure your work area is clear of others who could be struck. 4e. Keep your body out of the line-of-fire.	**M**
	5. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	5a. Inspect heavy equipment before use. 5b. Operators must complete and submit an equipment inspection form daily. 5c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 5d. Getting off or on any equipment while it is in motion is prohibited. 5e. Maintain three points-of-contact when getting on or off equipment. 5f. The operator shall use safety belts while equipment is in use. 5g. Use spotters for backing into tight work areas. 5h. When equipment is parked, the parking brake and bucket set on the ground 5i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	6a. Ground personnel must wear ANSI Class II high-visibility safety vests. 6b. Maintain positive contact between operator and ground personnel. 6c. Do not cross the path of moving equipment. 6d. Do not walk directly behind or to the side of heavy equipment. 6e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 6f. Equipment operators must check the area before swinging a load. 6g. Keep out of the heavy equipment swing radius/operating area if possible. 6h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 6i.Do not stand below or walk underneath a suspended load.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Land survey equipment; Stakes; Flagging; Hand tools, Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-02 Land Surveying					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-03 Clearing and Grubbing	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Clearing and Grubbing: Perform vegetation clearing and grubbing at each SWMU 77 subarea shown on the construction drawings. Vegetation will either be removed from the site or chipped and spread across the four subareas at SWMU 77.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, dump truck operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Clearing and Grubbing Description: Perform vegetation clearing and grubbing at each SWMU 77 subarea shown on the construction drawings. Vegetation will either be removed from the site or chipped and spread across the four subareas at SWMU 77.	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	2a. Lead is present in the soil. The routes of exposure for lead to enter the body are by inhalation and ingestion. Primary health effects of exposure are gastrointestinal disturbances, anemia, neuromuscular dysfunction, encephalopathy, and nephropathy. 2b. Conduct lead-related work in compliance with the OSHA lead in construction standard (29 CFR 1926.62). 2c. Use dust control measures and safe work practices to minimize exposure. 2d. Ensure that workers have received lead information and training. 2e. Wear PPE as defined in the SSHP and as directed by the SSHO. 2f. Follow personnel decontamination measures when exiting exclusion zone. 2g. Perform equipment decontamination before it exits the exclusion zone. 2h. Place used PPE in a separate container that is properly labeled.	**M**
	3. Hand/Power Tool Use (struck by; cut; pinch; puncture)	3a. Use the proper tool for the job. Do not use damaged tools. 3b. Inspect power tool cords and connectors before use. 3c. Wear work gloves that are suitable for the task to be performed (leather gloves for heavy work) and use safety glasses. 3d. Properly secure materials when working on them. 3e. Make sure your work area is clear of others who could be struck. 3f. Utility knife must have retractable blade. Cover when not in use. 3g. Cut away from the body. Keep your body out of the line-of-fire.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	4. Chain Saw Operation (cuts; punctures; flying debris; pinch points; fuel; fire)	4a. Only trained and authorized personnel shall operate equipment. 4b. Operator to wear hardhat, face shield, safety glasses, earplugs, and chaps. 4c. Secure loose fitting clothing with duct tape. 4d. Take precautions to avoid contact with poison ivy and poison oak. 4e. Personnel shall be familiar with cutting techniques. Always cut away from the body. Do not cut with the tip (nose) of the bar. Hold chain saw with both hands during cutting. Do not overreach with chain saw. Do not operate saw above shoulder height. 4f. Shut off chain saw when walking between work areas. 4g. Shut off engine before freeing pinched chains. 4h. Be alert to kickback hazard. Keep firm, proper grip on chain saw at all times. 4i. Use wedges to prevent chain binding.	**M**
	5. Chain Saw Equipment (improper inspection and maintenance)	5a. Inspect chain saw before each use. 5b. Chain saws must have an automatic chain brake and anti-kickback device. 5c. Do not use saws in which any safety feature is not functioning. 5d. Frequently check and adjust tension on chain. 5e. Do not use saws with dull chains. 5f. Do not increase force used as cutters become dull. Change the chain. 5g. Adjust idle speed to prevent the chain from moving during engine idling. 5h. Keep bar groove clean. Use only new or professionally sharpened chains.	**M**
	6. Fueling of Chain Saws (fire; spill)	6a. Smoking is not permitted near fueling areas. 6b. Shut off engine before refueling. 6c. A 20-B:C fire extinguisher shall be available when refueling. 6d. Store mixed-gas in metal safety cans with self-closing lid and flash arrestor. 6e. Metal fuel cans shall have a nozzle or a funnel shall be used during fueling.	**M**

Job Steps	Hazards	Controls	RAC
	7. Wood Chipper Operation (cuts; punctures; flying debris; pinch points; fuel; fire)	7a. Wear eye and hearing protection when operating a wood chipper. 7b. Do not put any part of your body into the feed table if chipper is in operation. 7c. Do not wear loose clothing, long-gauntlet gloves, rings, watches, or other items that could get caught on debris or parts of the machine. 7d. Wood chipper shall have a feed chute or feed table with sufficient height on side members to prevent operator contact with blades during normal operation; have a swinging baffle mounted in front of blades to prevent throwback of material; have an exhaust chute of sufficient length or design to prevent contact with blades; have a locking device on the ignition system to prevent unauthorized starting of equipment; and have cutting bars/blades sharpened, properly adjusted, and maintained IAW manufacturer recommendations. 7e. Chock/secure trailer-mounted wood chippers when detached from truck. 7f. Instruct wood chipper workers in the safe operation of the equipment. 7g. Never place any part of your body on the feed table when the wood chipper is in operation or the rotor is turning (use stick to push/poke material as needed). 7h. Feed material into wood chipper from the side of the hopper centerline. Turn away from the feed table when brush is taken into the rotor of the machine. 7i. Never feed stones, nails, and other hard/sharp debris into a wood chipper. 7j. Do not raise a wood chipper chute while machine rotors are turning. 7k. Use LOTO procedures when servicing/maintaining wood chipper equipment.	**M**
	8. Overhead Power Lines (electrocution)	8a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 8b. Do not operate equipment within 10-feet of overhead lines. 8c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 8d. De-energize lines and/or use engineering controls for protection as needed.	**M**
	9. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	9a. Inspect heavy equipment before use. 9b. Operators must complete and submit an equipment inspection form daily. 9c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 9d. Getting off or on any equipment while it is in motion is prohibited. 9e. Maintain three points-of-contact when getting on or off equipment. 9f. The operator shall use safety belts while equipment is in use. 9g. Use spotters for backing into tight work areas. 9h. When equipment is parked, the parking brake and bucket set on the ground 9i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**

Job Steps	Hazards	Controls	RAC
	10. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	10a. Ground personnel must wear ANSI Class II high-visibility safety vests. 10b. Maintain positive contact between operator and ground personnel. 10c. Do not cross the path of moving equipment. 10d. Do not walk directly behind or to the side of heavy equipment. 10e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 10f. Equipment operators must check the area before swinging a load. 10g. Keep out of the heavy equipment swing radius/operating area if possible. 10h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 10i.Do not stand below or walk underneath a suspended load.	**M**
	11. Fuel Spills (spill; fire; exposure)	11a. All spills touching the ground shall be reported immediately to the SSHO. 11b. During repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease; poly sheeting shall be placed on the ground beneath the repair location to prevent the ground from becoming contaminated from spills. 11c. A spill kit with absorbent pads shall be available for spill control/response. 11d. Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 11e. All spills no matter what size will be immediately contained as long as it doesn’t endanger personnel.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Heavy equipment; Water truck; Hand tools; Chain saw; Mixed-fuel safety can; Mesh face shield; Chaps; Wood chipper; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-03 Clearing and Grubbing					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-04 Sampling	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Perform Soil Sampling: Perform treatability and waste characterization. Collect soil samples for analysis. Perform stabilization agent treatability evaluation. Perform pre-treatment sampling and analysis and post-treatment Toxic Characteristic Leaching Procedure (TCLP) sampling and analysis. Perform waste characterization soil sampling and analysis. Decontaminate sampling equipment following sampling. Confirmation samples will be collected from the excavated soil area by an independent third party subcontracted by NAVFAC SE.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, drill rig operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Soil Sampling Description: Perform treatability and waste characterization sampling. Collect soil samples for analysis. Perform stabilization agent treatability evaluation. Perform pre-treatment sampling and analysis and post-treatment TCLP sampling and analysis. Perform waste characterization soil sampling and analysis. Decontaminate sampling equipment following sampling. Confirmation samples will be collected from the excavated soil area by an independent third party subcontracted by NAVFAC SE.	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	2a. Lead is present in the soil. The routes of exposure for lead to enter the body are by inhalation and ingestion. Primary health effects of exposure are gastrointestinal disturbances, anemia, neuromuscular dysfunction, encephalopathy, and nephropathy. 2b. Conduct lead-related work in compliance with the OSHA lead in construction standard (29 CFR 1926.62). 2c. Use dust control measures and safe work practices to minimize exposure. 2d. Ensure that workers have received lead information and training. 2e. Wear PPE as defined in the SSHP and as directed by the SSHO. 2f. Follow personnel decontamination measures when exiting exclusion zone. 2g. Perform equipment decontamination before it exits the exclusion zone. 2h. Place used PPE in a separate container that is properly labeled.	**M**
	3. Open excavated areas (uneven ground, step-down hazard)	3a. Watch for uneven ground 3b. Watch your step when stepping down from one elevation to another.	**M**
	4. Hand Tool Use (struck by; cut; pinch; puncture)	4a. Use the proper tool for the job. Do not use damaged tools. 4b. Wear safety glasses and work gloves suitable for the task to be performed. 4c. Make sure your work area is clear of others who could be struck. 4d. Keep your body out of the line-of-fire.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	5. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	5a. Inspect heavy equipment before use. 5b. Operators must complete and submit an equipment inspection form daily. 5c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 5d. Getting off or on any equipment while it is in motion is prohibited. 5e. Maintain three points-of-contact when getting on or off equipment. 5f. The operator shall use safety belts while equipment is in use. 5g. Use spotters for backing into tight work areas. 5h. When equipment is parked, the parking brake and bucket set on the ground 5i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	6a. Ground personnel must wear ANSI Class II high-visibility safety vests. 6b. Maintain positive contact between operator and ground personnel. 6c. Do not cross the path of moving equipment. 6d. Do not walk directly behind or to the side of heavy equipment. 6e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 6f. Equipment operators must check the area before swinging a load. 6g. Keep out of the heavy equipment swing radius/operating area if possible. 6h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 6i.Do not stand below or walk underneath a suspended load.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Hand tools (shovel); Sampling tools; Sample containers and labels; Sample shipping containers; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE; Decontamination supplies.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication and MSDS/SDS training (site personnel); Daily safety meeting (site personnel); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-04 Sampling					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-05 Soil Excavation	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Excavate Contaminated Soil: Perform soil excavation at four subareas within UXO 1 (SWMU 77) totaling 10,057 cubic yards (CY). Soils to be excavated by area are: Detonation Area near Concrete Pad Subarea (124 CY removed to a maximum depth of 1 foot below ground surface [bgs]); Former Pistol Range Subarea (691 CY removed to a maximum depth of 2 feet bgs); Pistol Range Subarea (2,517 CY removed to a maximum depth of 3 feet bgs); Rifle Range Subarea (6,725 CY removed to a maximum depth of 3 feet bgs). Use heavy equipment (excavator; loader; dozer) to load soil onto articulating dump trucks.
Load/Haul Contaminated Soil: Heavy equipment will be used to load lead-impacted soil onto an articulating dump truck. This soil will be hauled on site to a stockpile area for stabilization.
XRF Testing: After the impacted soil has been removed to the required depth, it will be tested using an X-ray fluorescence (XRF) instrument. In the event the target depths are reached but preliminary XRF testing indicates the excavation has not advanced to a point where the cleanup goals have been achieved, the NAVFAC representative, RPM, and Contracting Officer will be informed.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**

Job Steps	Hazards	Controls	RAC
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, dump truck operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Excavate Contaminated Soil Description: Perform soil excavation at four subareas within UXO 1	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
(SWMU 77) totaling 10,057 CY. Soils to be excavated by area are: Detonation Area near Concrete Pad Subarea (124 CY removed to a maximum depth of 1 foot bgs); Former Pistol Range Subarea (691 CY removed to a maximum depth of 2 feet bgs); Pistol Range Subarea (2,517 CY removed to a maximum depth of 3 feet bgs); Rifle Range Subarea (6,725 CY removed to a maximum depth of 3 feet bgs). Use heavy equipment (excavator; loader; dozer) to load soil onto articulating dump trucks.	2. Site Contaminants (contaminant exposure)	2a. Lead is present in the soil. The routes of exposure for lead to enter the body are by inhalation and ingestion. Primary health effects of exposure are gastrointestinal disturbances, anemia, neuromuscular dysfunction, encephalopathy, and nephropathy. 2b. Conduct lead-related work in compliance with the OSHA lead in construction standard (29 CFR 1926.62). 2c. Use dust control measures and safe work practices to minimize exposure. 2d. Ensure that workers have received lead information and training. 2e. Wear PPE as defined in the SSHP and as directed by the SSHO. 2f. Follow personnel decontamination measures when exiting exclusion zone. 2g. Perform equipment decontamination before it exits the exclusion zone. 2h. Place used PPE in a separate container that is properly labeled.	**M**
	3. Overhead Power Lines (electrocution)	3a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 3b. Do not operate equipment within 10-feet of overhead lines. 3c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 3d. De-energize lines and/or use engineering controls for protection as needed.	**M**
	4. Underground Utilities (electrocution).	4a. Perform/verify utility locate. Obtain/review utility map. 4b. Obtain a dig permit before any ground disturbance. 4d. Review and inspect utility mark-outs before drilling work. 4e. Protect utility mark-outs from damage, deterioration, or covering up with soil. 4f. If utilities are indicated in the area to be excavated, hand dig (or pot hole by air knife or water injection) two feet on either side of a marked utility to locate it. 4g. Contact the KO immediately if damage to underground utilities occurs.	**M**
	5. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	5a. Inspect heavy equipment before use. 5b. Operators must complete and submit an equipment inspection form daily. 5c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 5d. Getting off or on any equipment while it is in motion is prohibited. 5e. Maintain three points-of-contact when getting on or off equipment. 5f. The operator shall use safety belts while equipment is in use. 5g. Use spotters for backing into tight work areas. 5h. When equipment is parked, the parking brake and bucket set on the ground 5i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**

Job Steps	Hazards	Controls	RAC
	6. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	6a. Ground personnel must wear ANSI Class II high-visibility safety vests. 6b. Maintain positive contact between operator and ground personnel. 6c. Do not cross the path of moving equipment. 6d. Do not walk directly behind or to the side of heavy equipment. 6e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 6f. Equipment operators must check the area before swinging a load. 6g. Keep out of the heavy equipment swing radius/operating area if possible. 6h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should "signal" the equipment operator when they are exiting the area. 6i.Do not stand below or walk underneath a suspended load.	**M**
	7. Fire Hazards (fire; burns)	7a. Portable multi-purpose fire extinguishers must be maintained on site, kept fully charged, inspected monthly, and serviced annually. 7b. Have fire extinguishers in active work areas. 7c. Allow smoking only in designated areas. 7d. Use proper procedures for fueling of equipment if conducted on site. 7e. No ignition sources within 50 feet of flammable/combustible material storage. 7f. Fire lanes must be provided. 7g. Use metal fire safety cans to store small amounts of flammable liquids. 7h. A spill kit with absorbent pads shall be available for spill control/response.	**M**
	8. Fuel Spills (spill; fire; exposure)	8a. Immediately report all spills touching the ground to the SSHO. 8b. Place poly sheeting on the ground beneath the repair location during repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. 8c. Have spill kit with absorbent pads readily available for spill control/response. 8d. Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 8e. Immediately contain all spills no matter what size as long as it doesn't endanger personnel.	**M**
Load/Haul Contaminated Soil Description: Heavy equipment will be used to load lead-impacted soil onto an articulating dump truck. This soil will be hauled on site to a	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	2a. Follow lead-related health and safety procedures reviewed above.	**M**

Job Steps	Hazards	Controls	RAC
stockpile area for stabilization.	3. Fire protection (fire hazard)	3a. Have fire extinguishers on heavy equipment and in active work areas. 3b. Allow smoking only in designated areas. 3c. Use proper procedures for fueling of equipment if conducted on site.	**M**
	4. Overhead Power Lines (electrocution)	4a. Follow overhead power line control procedures reviewed above.	**M**
	5. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	5a. Follow heavy equipment – equipment operation safety control procedures reviewed above.	**M**
	6. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	6a. Follow heavy equipment – ground personnel safety control procedures reviewed above.	**M**
	7. Fire Hazards (fire; burns)	7a. Follow fire hazard control procedures reviewed above.	**M**
	8. Fuel Spills (spill; fire; exposure)	8a. Follow fuel spill control procedures reviewed above.	**M**
	9. Driving onsite (ground personnel struck by, crush)	9a. Wear required PPE. Watch for ground personnel. 9b. Wear seat belts. Observe posted speeds and traffic signs. Keep load secure. 9c. Check clearance from overhead lines. 9d. Set brakes and use chocks on an incline. 9e. Use spotters for backing of trucks into tight work areas.	**M**
XRF Testing Description: After the impacted soil has been removed to the required depth, it will be tested using an XRF instrument. In the event the target depths are reached but preliminary XRF testing indicates the excavation has not advanced to a point where the cleanup goals have been achieved, the NAVFAC representative, RPM, and Contracting Officer will be informed.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	2a. Follow lead-related health and safety procedures reviewed above.	**M**
	3. XRF Testing (radiation exposure)	3a. The XRF instrument contains a radioactive material source. 3b. Use the XRF in accordance with (IAW) the operator's radioactive material license and manufacturer instructions for safe instrument operation. 3c. Hold the XRF instrument at arm's length away from the body with the source pointed away 3d. Do not cradle the XRF under armpits or between legs for any period of time. 3e. Never point the XRF at anyone, even with the shutter closed. 3f. Be aware of the direction of the beam. Check before taking readings to ensure that no one is in the vicinity of the direction of the instrument beam. As a general rule, XRF readings should not be taken if anyone is within one foot of the far side of a surface being tested. 3g. Authorized users are responsible for insuring that instruments are properly secured and stored while working at temporary job sites.	**M**

ACTIVITY HAZARD ANALYSIS

Equipment to be Used	Training Requirements	Inspection Requirements
Site vehicles; Excavator; Loader; Water truck; Water hose with spray nozzle; Grade checker equipment; XRF; Hand tools; Traffic cones; Caution tape; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE; Decontamination supplies.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel); XRF instrument training (XRF operator).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily); XRF inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-05 Soil Excavation					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print:	11.	Print:	21.	Print:
	Sign:		Sign:		Sign:
2.	Print:	12.	Print:	22.	Print:
	Sign:		Sign:		Sign:
3.	Print:	13.	Print:	23.	Print:
	Sign:		Sign:		Sign:
4.	Print:	14.	Print:	24	Print:
	Sign:		Sign:		Sign:
5.	Print:	15.	Print:	25.	Print:
	Sign:		Sign:		Sign:
6.	Print:	16.	Print:	26.	Print:
	Sign:		Sign:		Sign:
7.	Print:	17.	Print:	27.	Print:
	Sign:		Sign:		Sign:
8.	Print:	18.	Print:	28.	Print:
	Sign:		Sign:		Sign:
9.	Print:	19.	Print:	29.	Print:
	Sign:		Sign:		Sign:
10.	Print:	20.	Print:	30.	Print:
	Sign:		Sign:		Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-06 Soil Stabilization	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Construct Stabilization Area: Construct a 50 foot by 90 foot stabilization area adjacent to each removal area at the SAR prior to excavation. Berm the stabilization area to prevent storm water runoff from entering the area. Cover the floor with a 30-mil HDPE liner. Cover staged material using 6-mil liners.
Soil Stabilization: Following excavation, mix lead-contaminated soils with a stabilization agent. The stabilization agent will chemically convert or immobilize the lead and other metal residues to a non-leachable form. Haul excavated soils to the stabilization area using 24 CY articulated trucks. Unload trucks onto the lined area where the stabilization agent is applied. Mix the soils with the stabilizing agent using excavators and a dozer. At the conclusion of the project, over excavate the stabilization area to a depth of 3 inches and treat the soils with the stabilization agent prior to disposal.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**

Job Steps	Hazards	Controls	RAC
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, drill rig operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Construct Stabilization Area Description: Construct a 50 foot by 90 foot stabilization area adjacent to each removal area at the SAR prior to excavation. Berm the stabilization area to prevent storm water runoff from entering the area. Cover the floor with a 30-mil HDPE liner. Cover staged material using 6-mil liners.	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	2. Site Contaminants (contaminant exposure)	2a. Lead is present in the soil. The routes of exposure for lead to enter the body are by inhalation and ingestion. Primary health effects of exposure are gastrointestinal disturbances, anemia, neuromuscular dysfunction, encephalopathy, and nephropathy. 2b. Conduct lead-related work in compliance with the OSHA lead in construction standard (29 CFR 1926.62). 2c. Use dust control measures and safe work practices to minimize exposure. 2d. Ensure that workers have received lead information and training. 2e. Wear PPE as defined in the SSHP and as directed by the SSHO. 2f. Follow personnel decontamination measures when exiting exclusion zone. 2g. Perform equipment decontamination before it exits the exclusion zone. 2h. Place used PPE in a separate container that is properly labeled.	**M**
	3. Overhead Power Lines (electrocution)	3a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 3b. Do not operate equipment within 10-feet of overhead lines. 3c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 3d. De-energize lines and/or use engineering controls for protection as needed.	**M**
	4. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	4a. Inspect heavy equipment before use. 4b. Operators must complete and submit an equipment inspection form daily. 4c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 4d. Getting off or on any equipment while it is in motion is prohibited. 4e. Maintain three points-of-contact when getting on or off equipment. 4f. The operator shall use safety belts while equipment is in use. 4g. Use spotters for backing into tight work areas. 4h. When equipment is parked, the parking brake and bucket set on the ground 4i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**

Job Steps	Hazards	Controls	RAC
	5. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	5a. Ground personnel must wear ANSI Class II high-visibility safety vests. 5b. Maintain positive contact between operator and ground personnel. 5c. Do not cross the path of moving equipment. 5d. Do not walk directly behind or to the side of heavy equipment. 5e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 5f. Equipment operators must check the area before swinging a load. 5g. Keep out of the heavy equipment swing radius/operating area if possible. 5h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should "signal" the equipment operator when they are exiting the area. 5i.Do not stand below or walk underneath a suspended load.	**M**
	6. Fire Hazards (fire; burns)	6a. Portable multi-purpose fire extinguishers must be maintained on site, kept fully charged, inspected monthly, and serviced annually. 6b. Have fire extinguishers in active work areas. 6c. Allow smoking only in designated areas. 6d. Use proper procedures for fueling of equipment if conducted on site. 6e. No ignition sources within 50 feet of flammable/combustible material storage. 6f. Fire lanes must be provided. 6g. Use metal fire safety cans to store small amounts of flammable liquids. 6h. A spill kit with absorbent pads shall be available for spill control/response.	**M**
	7. Fuel Spills (spill; fire; exposure)	7a. Immediately report all spills touching the ground to the SSHO. 7b. Place poly sheeting on the ground beneath the repair location during repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. 7c. Have spill kit with absorbent pads readily available for spill control/response. 7d. Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 7e. Immediately contain all spills no matter what size as long as it doesn't endanger personnel.	**M**
Soil Stabilization Description: Following excavation, mix lead-contaminated soils with a	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**

Job Steps	Hazards	Controls	RAC
stabilization agent. The stabilization agent will chemically convert or immobilize the lead and other metal residues to a non-leachable form. Haul excavated soils to the stabilization area using 24 CY articulated trucks. Unload trucks onto the lined area where the stabilization agent is applied. Mix the soils with the stabilizing agent using excavators and a dozer. At the conclusion of the project, over excavate the stabilization area to a depth of 3 inches and treat the soils with the stabilization agent prior to disposal.	2. Site Contaminants (contaminant exposure)	2a. Follow lead-related health and safety procedures reviewed above.	**M**
	3. Fire protection (fire hazard)	3a. Have fire extinguishers on heavy equipment and in active work areas. 3b. Allow smoking only in designated areas. 3c. Use proper procedures for fueling of equipment if conducted on site.	**M**
	4. Overhead Power Lines (electrocution)	4a. Follow overhead power line control procedures reviewed above.	**M**
	5. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	5a. Follow heavy equipment – equipment operation safety control procedures reviewed above.	**M**
	6. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	6a. Follow heavy equipment – ground personnel safety control procedures reviewed above.	**M**
	7. Fire Hazards (fire; burns)	7a. Follow fire hazard control procedures reviewed above.	**M**
	8. Fuel Spills (spill; fire; exposure)	8a. Follow fuel spill control procedures reviewed above.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Site vehicles; Excavator; Loader; Dozer; Water truck; Hand tools; Stabilizing agent; Sheet poly; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE; Decontamination supplies.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-06 Soil Stabilization					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print:	11.	Print:	21.	Print:
	Sign:		Sign:		Sign:
2.	Print:	12.	Print:	22.	Print:
	Sign:		Sign:		Sign:
3.	Print:	13.	Print:	23.	Print:
	Sign:		Sign:		Sign:
4.	Print:	14.	Print:	24	Print:
	Sign:		Sign:		Sign:
5.	Print:	15.	Print:	25.	Print:
	Sign:		Sign:		Sign:
6.	Print:	16.	Print:	26.	Print:
	Sign:		Sign:		Sign:
7.	Print:	17.	Print:	27.	Print:
	Sign:		Sign:		Sign:
8.	Print:	18.	Print:	28.	Print:
	Sign:		Sign:		Sign:
9.	Print:	19.	Print:	29.	Print:
	Sign:		Sign:		Sign:
10.	Print:	20.	Print:	30.	Print:
	Sign:		Sign:		Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-07 Grade Soil	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Grade, Backfill and Compact Soil: Final grading will provide positive drainage of surface water across the restored area. Grade so that there will be no closed drainage areas that could allow surface water to pond.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, dump truck operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Grade Soil Description: Grading will provide positive drainage of surface water across the restored area. Grade so that there will be no closed drainage areas that could allow surface water to pond.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Fire Hazards (fire; burns)	2a. Portable multi-purpose fire extinguishers must be maintained on site, kept fully charged, inspected monthly, and serviced annually. 2b. Have fire extinguishers in active work areas. 2c. Allow smoking only in designated areas. 2d. Use proper procedures for fueling of equipment if conducted on site. 2e. No ignition sources within 50 feet of flammable/combustible material storage. 2f. Fire lanes must be provided. 2g. Use metal fire safety cans to store small amounts of flammable liquids. 2h. A spill kit with absorbent pads shall be available for spill control/response.	**M**
	3. Overhead Power Lines (electrocution)	3a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 3b. Do not operate equipment within 10-feet of overhead lines. 3c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 3d. De-energize lines and/or use engineering controls for protection as needed.	**M**

Job Steps	Hazards	Controls	RAC
	4. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	4a. Inspect heavy equipment before use. 4b. Operators must complete and submit an equipment inspection form daily. 4c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 4d. Getting off or on any equipment while it is in motion is prohibited. 4e. Maintain three points-of-contact when getting on or off equipment. 4f. The operator shall use safety belts while equipment is in use. 4g. Use spotters for backing into tight work areas. 4h. When equipment is parked, the parking brake and bucket set on the ground 4i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	5. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	5a. Ground personnel must wear ANSI Class II high-visibility safety vests. 5b. Maintain positive contact between operator and ground personnel. 5c. Do not cross the path of moving equipment. 5d. Do not walk directly behind or to the side of heavy equipment. 5e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 5f. Equipment operators must check the area before swinging a load. 5g. Keep out of the heavy equipment swing radius/operating area if possible. 5h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 5i.Do not stand below or walk underneath a suspended load.	**M**
	6. Fuel Spills (spill; fire; exposure)	6a. All spills touching the ground shall be reported immediately to the SSHO. 6b. During repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease; poly sheeting shall be placed on the ground beneath the repair location to prevent the ground from becoming contaminated from spills. 6c. A spill kit with absorbent pads shall be available for spill control/response. 6d. Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 6e. All spills no matter what size will be immediately contained as long as it doesn’t endanger personnel.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements

Heavy equipment; Water truck; Hand tools; Density gauge; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-07 Grade, Backfill and Compact Soil					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print:	11.	Print:	21.	Print:
	Sign:		Sign:		Sign:
2.	Print:	12.	Print:	22.	Print:
	Sign:		Sign:		Sign:
3.	Print:	13.	Print:	23.	Print:
	Sign:		Sign:		Sign:
4.	Print:	14.	Print:	24	Print:
	Sign:		Sign:		Sign:
5.	Print:	15.	Print:	25.	Print:
	Sign:		Sign:		Sign:
6.	Print:	16.	Print:	26.	Print:
	Sign:		Sign:		Sign:
7.	Print:	17.	Print:	27.	Print:
	Sign:		Sign:		Sign:
8.	Print:	18.	Print:	28.	Print:
	Sign:		Sign:		Sign:
9.	Print:	19.	Print:	29.	Print:
	Sign:		Sign:		Sign:
10.	Print:	20.	Print:	30.	Print:
	Sign:		Sign:		Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-08 Heavy Equipment Decontamination	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities. Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Decontaminate Heavy Equipment: Conduct dry decontamination on heavy equipment.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) to move heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation, dump truck operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Decontaminate Heavy Equipment Description: Conduct dry decontamination on heavy equipment.	1. All Site Activity Hazards	1a. Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	2a. Lead is present in the soil. The routes of exposure for lead to enter the body are by inhalation and ingestion. Primary health effects of exposure are gastrointestinal disturbances, anemia, neuromuscular dysfunction, encephalopathy, and nephropathy. 2b. Conduct lead-related work in compliance with the OSHA lead in construction standard (29 CFR 1926.62). 2c. Use dust control measures and safe work practices to minimize exposure. 2d. Ensure that workers have received lead information and training. 2e. Wear PPE as defined in the SSHP and as directed by the SSHO. 2f. Follow personnel decontamination measures when exiting exclusion zone. 2g. Perform equipment decontamination before it exits the exclusion zone. 2h. Place used PPE in a separate container that is properly labeled.	**M**
	3. Fire protection (fire hazard)	3a. Have fire extinguishers on heavy equipment and in active work areas. 3b. Allow smoking only in designated areas. 3c. Use proper procedures for fueling of equipment if conducted on site.	**M**

Job Steps	Hazards	Controls	RAC
	4. Overhead Power Lines (electrocution)	4a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 4b. Do not operate equipment within 10-feet of overhead lines. 4c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 4d. De-energize lines and/or use engineering controls for protection as needed.	**M**
	5. Heavy equipment – Equipment operation (struck by equipment hazard; noise exposure)	5a. Inspect heavy equipment before use. 5b. Operators must complete and submit an equipment inspection form daily. 5c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 5d. Getting off or on any equipment while it is in motion is prohibited. 5e. Maintain three points-of-contact when getting on or off equipment. 5f. The operator shall use safety belts while equipment is in use. 5g. Use spotters for backing into tight work areas. 5h. When equipment is parked, the parking brake and bucket set on the ground 5i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	6a. Ground personnel must wear ANSI Class II high-visibility safety vests. 6b. Maintain positive contact between operator and ground personnel. 6c. Do not cross the path of moving equipment. 6d. Do not walk directly behind or to the side of heavy equipment. 6e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 6f. Equipment operators must check the area before swinging a load. 6g. Keep out of the heavy equipment swing radius/operating area if possible. 6h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 6i.Do not stand below or walk underneath a suspended load.	**M**
	7. Fire Hazards (fire; burns)	7a. Portable multi-purpose fire extinguishers must be maintained on site, kept fully charged, inspected monthly, and serviced annually. 7b. Have fire extinguishers in active work areas. 7c. Allow smoking only in designated areas. 7d. Use proper procedures for fueling of equipment if conducted on site. 7e. No ignition sources within 50 feet of flammable/combustible material storage. 7f. Fire lanes must be provided. 7g. Use metal fire safety cans to store small amounts of flammable liquids. 7h. A spill kit with absorbent pads shall be available for spill control/response.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	8. Fuel Spills (spill; fire; exposure)	8a. Immediately report all spills touching the ground to the SSHO. 8b. Place poly sheeting on the ground beneath the repair location during repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. 8c. Have spill kit with absorbent pads readily available for spill control/response. 8d. Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 8e. Immediately contain all spills no matter what size as long as it doesn't endanger personnel.	**M**
	9. Hand tool use (struck by; cut; pinch; puncture)	9a. Use the proper tool for the job. Do not use damaged tools. 9b. Wear work gloves that are suitable for the task to be performed (leather gloves for heavy work) and use safety glasses. 9c. Properly secure materials when working on them. 9d.Make sure your work area is clear of others who could be struck. 9e.Keep body out of the line-of-fire.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Heavy equipment; Water truck; Hand tools (shovels, broom, gong brushes); Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE.	Site safety orientation briefing/SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-08 Heavy Equipment Decontamination					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print:	11.	Print:	21.	Print:
	Sign:		Sign:		Sign:
2.	Print:	12.	Print:	22.	Print:
	Sign:		Sign:		Sign:
3.	Print:	13.	Print:	23.	Print:
	Sign:		Sign:		Sign:
4.	Print:	14.	Print:	24	Print:
	Sign:		Sign:		Sign:
5.	Print:	15.	Print:	25.	Print:
	Sign:		Sign:		Sign:
6.	Print:	16.	Print:	26.	Print:
	Sign:		Sign:		Sign:
7.	Print:	17.	Print:	27.	Print:
	Sign:		Sign:		Sign:
8.	Print:	18.	Print:	28.	Print:
	Sign:		Sign:		Sign:
9.	Print:	19.	Print:	29.	Print:
	Sign:		Sign:		Sign:
10.	Print:	20.	Print:	30.	Print:
	Sign:		Sign:		Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-09 Waste Transportation and Disposal	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
Previous investigations and site work have identified munitions and explosives of concern (MEC) at the site; however, no MEC was identified during the full RCRA Facility Investigation (RFI) field investigation. It is not anticipated that any MEC will be located during the excavation and disposal of soils; however, MEC construction support will need to be performed during the removal action.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Waste Transportation and Disposal: Treated soils will be transported to Waste Management's El Coqui Landfill, Humacao, a RCRA Subtitle D permitted facility in Puerto Rico. Handle and dispose of all investigation-derived waste (IDW) generated at the site in accordance with (IAW) applicable requirements. Transport waste for disposal. Off-load waste at landfill.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Waste Transportation and Disposal Description: Treated soils will be transported to Waste Management's El Coqui Landfill, Humacao, a RCRA Subtitle D permitted facility in Puerto Rico. Handle and dispose of all IDW generated at the site IAW applicable requirements. Transport waste for disposal. Off-load waste at landfill.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Injuries (cuts; lacerations)	2a. Inspect items for sharp edges before handling. 2b. Wear leather gloves when handling sharp objects. 2c. Be aware of, and avoid, pinch point and crushing hazards.	**M**

Job Steps	Hazards	Controls	RAC
	3. Drum Handling (pinch, crush, cut, back strain)	3a. Use drum dolly whenever possible to move drums. 3b. Do not fill drums to capacity (become too heavy or spill contents). 3c. Inspect drum condition. Check for secure closure (i.e., drum ring/bolt, bungs). 3d. Survey the path of movement. Look for sloped ground, uneven surfaces, rocks, and soft ground (can use plywood sheet for movement over soft ground). 3e. Clear the pathway of debris, materials and equipment. 3f. Wear sturdy gloves to avoid cuts on sharp edges and to obtain a good grip. 3g. Check the weight of the drum and if safely manageable. 3h. Place body close to the drum. Have one foot close to the base of the drum and one foot set back slightly. Grasp the top of the drum on the near and opposite side. Use a forward/backward rocking motion and use momentum to move the drum weight onto the near side bottom rim of the drum. Keep the drum balanced on the near side bottom rim at a 35- to 45-degree angle. Move the drum slowly maintaining the drum balance on the near side bottom rim without crossing over the feet or hands. Watch of nearby objects (i.e., walls, drums) that may crush fingers before setting the drum down.	**M**
	4. Traffic Hazards (vehicle accident)	4a. Check load to make sure it is tarped and secure. 4b. Perform pre-trip safety inspection. Vehicle safety equipment (i.e., lights, guards, brakes, horn, etc.) must be functional at all times. 4c. Follow all traffic rules. Obey speed limits and traffic signs. Use safety belt. Drive defensively. 4d. No cell phone use allowed when driving. 4e. Set the parking brake when the truck is parked. 4f. Maintain three points-of-contact when getting on or off vehicle.	**M**

Job Steps	Hazards	Controls	RAC
	5. Struck-By Debris	5a. Driver to remain inside of truck during unloading. 5b. No personnel to be in off-loading area during off-loading (within 25 feet). 5c. Watch for other vehicles and heavy equipment. 5d. Follow instructions of facility personnel. 5e. Set the parking brake when the truck is parked. 5f. Use spotter for backing into tight work areas. 5g. Situate truck on level and stable surface before when dumping. 5h. When dumping a load from a bed equipped with a tailgate, a spotter must be positioned a safe distance from the vehicle, such that the spotter can observe the bed and notify the operator if an obstruction occurs. The spotter and driver must be in agreement on the proper positioning. 5i. Spotter must have suitable means of communication with driver. 5j. Trucks shall not move until dump body is in the full down position. 5k. If the load fails to exit the bed properly or becomes stuck; then lower the bed the correct the problem if it can be done safely. 5l. Keep personnel out of blind spots. Have personnel stay away from the sides of the truck during dumping. The buffer zone should be at least 1.5 times the length of the truck bed.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Waste disposal drums; Drum dolly; Waste hauling vehicles; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE.	Site safety orientation briefing/SSHP/AHA review (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training(site personnel); Daily safety meeting (site personnel); Commercial Driver License with Hazmat endorsement (drivers); MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Waste transport vehicle inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-09 Waste Transportation and Disposal					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity/Work Task: AHA-10 Site Restoration and Demobilization	Overall Risk Assessment Code (RAC) (Use highest code) **M**
Project Location: RCRA Interim Corrective Measure, UXO 1 (SWMU 77) Soil Removal, Naval Activity Puerto Rico, Ceiba, Puerto Rico	**Risk Assessment Code (RAC) Matrix**
Contract / Task Order Number: N62470-12-D-7016; CTO JM01	
Date Prepared: 5/1/2015	
Prepared by (Name/Title): Ken Beatty, CSP, CHSP / SHM	
Reviewed by (Name/Title): Glen Mayekawa, CIH / Corporate HSM	

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
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Notes: (Field Notes, Review Comments, etc.)
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General S&H: Robert Hernandez
HAZWOPER: Robert Hernandez
Fire Protection: Robert Hernandez
Munitions and Explosives of Concern (MEC): SUXOS/MEC Construction Support Team Lead (TBD).
Lead: Robert Hernandez.

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Site Restoration: Restore all disturbed and graded areas to match existing site conditions.
Perform Site Cleanup: Clean up debris. Place debris in waste bin. Remove temporary safety fence and signs. Demobilize supplies.
Decontaminate Equipment: Use dry decontamination methods to clean off heavy equipment and other equipment.
Post-Construction As-Built Land Surveying: Perform a post-construction as-built survey by a licensed land surveyor to verify locations and elevations.
Demobilize Personnel and Equipment: Demobilize equipment and temporary facilities from the site. Demobilize personnel from the site.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	1a. Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. 1b. Use face shield for grinding, cutting, and pressure washing 1c. Use earplugs if noise hazard present. 1d. Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	2a. Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). 2b. Use short steps when walking on slippery surfaces. 2c. Be aware of terrain conditions such as holes and rocks. 2d. Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	3a. Material handling (lifting and carrying) will occur. 3b. Wear work gloves when handling materials. 3c. Watch for items that can cut, puncture, pinch, or crush. 3d. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. 3e. Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	4a. Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). 4b. Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	5a Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. 5b. Wear light colored clothing (cotton). 5c. Know the signs and symptoms of heat stress and treatment. 5d. Work at a steady pace and do not over exert yourself. 5e. Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). 5f. Have personnel take breaks to cool down in a shaded rest area. 5g. Take frequent rest breaks in shaded areas. 5h Adjust work-rest schedules as needed to prevent heat strain. 5i. Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	6a. Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. 6b. Use insect repellent with DEET as needed. 6c. Wear protective clothing if contact with poisonous plants will occur. 6d. Have poison oak/ivy protective cream and cleanser on hand. 6e. Avoid walking in areas known to be populated with snakes. 6f. Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	7a. Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. 7b. Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. 7c. Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). 7d. Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). 7e. In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. 7f. Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

Job Steps	Hazards	Controls	RAC
	8. MEC Construction Support (explosion; injury)	8a. UXO escort/MEC Construction support is required for fieldwork potential munitions subareas. The UXO escort will conduct a visual survey of the ground surface ahead of the field work as a precaution. 8b. If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Potential exposure to CWM at the site is not anticipated. In the event that HTRW is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify/implement protective measures. 8c. The UXO escort will clearly mark any area with visible MEC/MPPEH and the area will be avoided. Visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO Team Leader. 8d. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties. 8e. The UXO escort will conduct UXO avoidance surveys as required using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the UXO escort will stop operations in the area until authorization to proceed is provided.	**M**
Site Restoration Description: Restore all disturbed areas to match existing site conditions.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use (struck by; cut; pinch; puncture)	2a. Use the proper tool for the job. Do not use damaged tools. 2b. Wear work gloves that are suitable for the task to be performed (leather gloves for heavy work) and use safety glasses. 2c. Properly secure materials when working on them. 2d. Make sure your work area is clear of others who could be struck. 2e. Keep your body out of the line-of-fire.	**M**
	3. Fire Hazards (fire; burns)	3a. Portable multi-purpose fire extinguishers must be maintained on site, kept fully charged, inspected monthly, and serviced annually. 3b. Have fire extinguishers in active work areas. 3c. Allow smoking only in designated areas. 3d. Use proper procedures for fueling of equipment if conducted on site. 3e. No ignition sources within 50 feet of flammable/combustible material storage. 3f. Fire lanes must be provided. 3g. Use metal fire safety cans to store small amounts of flammable liquids. 3h. A spill kit with absorbent pads shall be available for spill control/response.	**M**
	4. Overhead Power Lines (electrocution)	4a. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks) into a work area 4b. Do not operate equipment within 10-feet of overhead lines. 4c. Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 11F and Table 11-1. 4d. De-energize lines and/or use engineering controls for protection as needed.	**M**

Job Steps	Hazards	Controls	RAC
	5. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	5a. Inspect heavy equipment before use. 5b. Operators must complete and submit an equipment inspection form daily. 5c. Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, backup alarm, etc.) must be functional at all times. 5d. Getting off or on any equipment while it is in motion is prohibited. 5e. Maintain three points-of-contact when getting on or off equipment. 5f. The operator shall use safety belts while equipment is in use. 5g. Use spotters for backing into tight work areas. 5h. When equipment is parked, the parking brake and bucket set on the ground 5i. Heavy equipment operators must inform the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	6a. Ground personnel must wear ANSI Class II high-visibility safety vests. 6b. Maintain positive contact between operator and ground personnel. 6c. Do not cross the path of moving equipment. 6d. Do not walk directly behind or to the side of heavy equipment. 6e. Equipment operators must continuously be aware of personnel and equipment in the work area. Operators must look behind before backing. 6f. Equipment operators must check the area before swinging a load. 6g. Keep out of the heavy equipment swing radius/operating area if possible. 6h. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. 6i.Do not stand below or walk underneath a suspended load.	**M**
	7. Fuel Spills (spill; fire; exposure)	7a. All spills touching the ground shall be reported immediately to the SSHO. 7b. During repair of hoses or other parts that may result in the loss or release of fluids, oils, or grease; poly sheeting shall be placed on the ground beneath the repair location to prevent the ground from becoming contaminated from spills. 7c. A spill kit with absorbent pads shall be available for spill control/response. 7d. Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). 7e. All spills no matter what size will be immediately contained as long as it doesn’t endanger personnel.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
Perform Site Cleanup Description: Clean up debris. Place debris in waste bin. Remove temporary safety fence and signs. Demobilize supplies.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use (struck by; cut; pinch; puncture)	2a. Follow hand tool use safety control procedures reviewed above.	**M**
Decontaminate Equipment Description: Use dry decontamination methods to clean off heavy equipment and other equipment.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Fire Hazards (fire; burns)	2a. Have fire extinguishers available. 2b. Allow smoking only in designated areas. 2c. Use proper procedures for fueling of equipment if conducted on site.	**M**
	3. Hand Tool Use (struck by; cut; pinch; puncture)	3a. Follow hand tool use safety control procedures reviewed above.	**M**
	4. Overhead Power Lines (electrocution)	4a. Follow overhead power line control procedures reviewed above.	**M**
	5. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	5a. Follow heavy equipment – equipment operation safety control procedures reviewed above.	**M**
	6. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	6a. Follow heavy equipment – ground personnel safety control procedures reviewed above.	**M**
Post-Construction As-Built Land Surveying Description: Perform a post-construction as-built survey by a licensed land surveyor to verify locations and elevations.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Moving Supplies (cut, scrape, back strain)	2a. Watch for sharp edges or points on objects to be handled. 2b. Wear work gloves when handling materials. 2c. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting.	**M**
	3. Hand Tool Use (struck by; cut; pinch; puncture)	3a. Follow hand tool use safety control procedures reviewed above.	**M**
	4. Vehicle and Equipment Traffic (struck by)	4a. Establish parking area for vehicles. 4b. Establish site entrance and exit routes for vehicles. 4c. Do not walk in pathways for vehicle or equipment traffic. 4d. Personnel must look for traffic before walking. 4e. Personnel must wear ANSI Class II high-visibility safety vests.	**M**

Job Steps	Hazards	Controls	RAC
	5. Heavy equipment – Ground personnel (struck by, caught in between; crush; noise exposure)	5a. Follow heavy equipment – ground personnel safety control procedures reviewed above.	**M**
Demobilize Personnel and Equipment Description: Demobilize equipment and temporary facilities from the site. Demobilize personnel from the site.	1. All Site Activity Hazards	1a. Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Moving Supplies (cut, scrape, back strain)	2a. Follow moving supplies safety control procedures reviewed above.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Heavy equipment; Hand tools; Land surveying equipment; Fire extinguisher; Spill kit; First-aid kit; Eyewash supplies; PPE.	Site safety orientation briefing/SSHP/AHA review (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS training(site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator MEC training (MEC personnel); Lead training (Lead Competent Person; site personnel).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily); Magnetometer inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-10 Site Restoration and Demobilization					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

APPENDIX F. EXPLOSIVES SAFETY SUBMISSION

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DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY
FARRAGUT HALL
3817 STRAUSS AVENUE, SUITE 108
INDIAN HEAD MD 20640-5151

8020
Ser N54-SJ/7164
15 Apr 15

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Director, BRAC Program Management Office, East (BPMOE/GP)

Subj: EXPLOSIVES SAFETY SUBMISSION - AMENDMENT 2 (DATED FEBRUARY 2015) - TO EXPLOSIVES SAFETY SUBMISSION (FINAL DATED JUNE 2012) - SITE CHARACTERIZATION AND RESOURCE CONSERVATION AND RECOVERY ACT CORRECTIVE ACTION INTERIM MEASURE CONSTRUCTION SUPPORT - SITE UXO 1 (SOLID WASTE MANAGEMENT UNIT 77) - SMALL ARMS RANGE - U.S. NAVAL ACTIVITY, PUERTO RICO [ESS/X-REF DD-048 & FF-022/ GG-026F]

Ref: (a) *Explosives Safety Submission for Full Resource Conservation and Recovery Act Facility Investigation, SWMU 77 - Small Arms Range, U.S. Naval Activity, Puerto Rico, dtd Jun 12*
(b) NOSSA ltr 8020 Ser N54-SJ/4281 of 29 Jun 12 [DD-048]
(c) DDESB memo DDESB-PE of 25 Jul 12 [DD-048]
(d) NOSSA ltr 8020 Ser N54-SJ/4317 of 27 Jul 12 [DD-048F]
(e) NOSSA ltr 8020 Ser N54-SJ/6089 of 28 Jan 14 [FF-022]
(f) DDESB memo DDESB-PE of 18 Feb 14 [FF-022]
(g) NOSSA ltr 8020 Ser N54-SJ/6105 of 25 Feb 14 [FF-022F]
(h) *Amendment 2 Explosives Safety Submission for Site Characterization and Resource Conservation and Recovery Act Corrective Action Interim Measure Construction Support, Site UXO 1 (SWMU 77), U.S. Naval Activity, Puerto Rico, dtd Feb 15* [GG-026]
(i) NOSSA ltr 8020 Ser N54-SJ/7126 of 24 Feb 15 [GG-026]
(j) NAVSEA OP 5, Volume 1, Seventh Revision
(k) NOSSAINST 8020.15D

Encl: (1) DDESB memo DDESB-PE of 17 Mar 15 [GG-026]

1. Enclosure (1), which provides final safety approval for Amendment 2 to reference (a), which was submitted, amended, and approved by references (b) through (g), at U.S. Naval Activity (NAVACT), Puerto Rico, is forwarded for continuing action. Final safety approval is based upon adherence to the conditions provided in references (h) and (i) and enclosure (1).

Subj: EXPLOSIVES SAFETY SUBMISSION - AMENDMENT 2 (DATED FEBRUARY 2015) - TO EXPLOSIVES SAFETY SUBMISSION (FINAL DATED JUNE 2012) - SITE CHARACTERIZATION AND RESOURCE CONSERVATION AND RECOVERY ACT CORRECTIVE ACTION INTERIM MEASURE CONSTRUCTION SUPPORT - SITE UXO 1 (SOLID WASTE MANAGEMENT UNIT 77) - SMALL ARMS RANGE - U.S. NAVAL ACTIVITY, PUERTO RICO [ESS/X-REF DD-048 & FF-022/ GG-026F]

2. If changes occur, which could increase explosives hazards to site workers or the public, an amendment to this Explosives Safety Submission (ESS) must be submitted through the Naval Ordnance Safety and Security Activity (NOSSA), to the Department of Defense Explosives Safety Board (DDESB), for review and approval, following the criteria of reference (j) and the requirements of reference (k).

3. As stated in the next-to-last-paragraph of enclosure (1), all other stipulations and requirements established via the original ESS, which was submitted, amended, and approved by references (b) through (g), remain in effect.

4. The NOSSA point-of-contact for questions relating to the explosives safety aspects of this project is Mr. Shawn Jorgensen, N545, at DSN: 354-6055; Commercial: (301) 744-6055; or E-mail: shawn.a.jorgensen@navy.mil; and for questions relating to the environmental aspects of this project is Mrs. Kathy Garcia, N47, at DSN: 354-5636; Commercial: (301) 744-5636; or E-mail: kathy.m.garcia@navy.mil.

Gary A. Hogue

GARY A. HOGUE
By direction

Copy to (w/encl):
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DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
4800 MARK CENTER DRIVE, SUITE 16E12
ALEXANDRIA, VIRGINIA 22350-3606

DDESB-PE

MAR 17 2015

MEMORANDUM FOR COMMANDING OFFICER, NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY (ATTENTION: CODE N54)

SUBJECT: DDESB Approval of Amendment 2, Explosives Safety Submission, Site Characterization and RCRA Corrective Action Interim Measure Construction Support Site UXO 1 – Small Arms Range, US Naval Activity, Puerto Rico [ESS/X-REF DD-048 & FF-022/GG-026]

References: (a) NOSSA ltr 8020 Ser N54-SJ/7126 of 24 February 2015, First Endorsement on BRAC PMO East ltr 5090 Ser BPMOE/15-085 of 10 February 2015, Subject: Explosives Safety Submission – Amendment 2 (Dated February 2015) – to Explosives Safety Submission (Final Dated June 2012) – Site Characterization and Resource Conservation and Recovery Act Corrective Action Interim Measure Construction Support – Site UXO 1 (Solid Waste Management Unit 77) – Small Arms Range – U.S. Naval Activity, Puerto Rico [ESS/X-REF DD-048 & FF-022/ GG-026]

(b) DoD 6055.09-M, DoD Ammunition and Explosives Safety Standards, date varies by volume

(c) DDESB TP-16, Methodologies for Calculating Primary Fragment Characteristics, Revision 4, 2 August 2012

The Department of Defense Explosives Safety Board (DDESB) Staff has reviewed the subject Amendment 2 to the explosives safety submission (ESS) forwarded by reference (a) against the requirements of reference (b). Based on the information provided, approval is granted for removal and treatment of material potentially presenting an explosive hazard (MPPEH) and munitions and explosives of concern (MEC) at U.S. Naval Activity, Puerto Rico.

This amendment incorporates the 21 August 2014 Fragmentation Data Review Forms of reference (c) and adds mechanical screening as a mechanized low input unintentional detonation operation for the UXO 1 (Solid Waste Management Unit 77) – Small Arms Range.

All other stipulations and requirements established via the original ESS and subsequent amendment remain in effect.

ENCL (1)

The point of contact for this action is Ms. Kristene Bigej, (571) 372-6705, DSN 372-6705, E-mail address: kristene.a.bigej.civ@mail.mil.

THIERRY L. CHIAPELLO
Executive Director

FINAL
Amendment 2
Explosives Safety Submission
for
Site Characterization and
RCRA Corrective Action Interim Measure
Construction Support
Site UXO 1 (SWMU 77) – Small Arms Range

Naval Activity Puerto Rico
Ceiba, Puerto Rico

Contract Task Order JM04

February 2015

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Under the

NAVFAC CLEAN 8012 Program
Contract N62470-08-D-8012

Prepared by

CH2MHILL

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Acronyms and Abbreviations

bgs	Below ground surface
BIP	Blow-in-place
BRAC	Base Realignment and Closure
CLEAN	Comprehensive Long-Term Environmental Action Navy
CO	Commanding Officer
CS	O-Chlorobenzalmalonitrile - Tear Gas
CTO	Contract Task Order
DDESB	Department of Defense Explosives Safety Board
Det	Detachment
DoD	Department of Defense
EM	Engineer Manual and Electromagnetic
EOD	Explosive Ordnance Disposal
ESQD	Explosive Safety Quantity Distance
ESS	Explosives Safety Submission
EZ	Exclusion Zone
FDRF	Fragmentation Data Review Form
GPS	Global Positioning System
GSV	Geophysical system verification
HFD	Hazardous Fragment Distance
HH	hand held
HTRW	Hazardous, toxic, and radiological waste
IHC	Interim Hazard Classification
ISO	Industry standard object
IVS	Instrument verification strip
lbs	Pounds
MC	Munitions Constituents
MDAS	Material Documented as Safe
MDEH	Material Documented as an Explosive Hazard
MEC	Munitions and Explosives of Concern
MFD	Maximum Fragment Distance
MGFD	Munition with the Greatest Fragmentation Distance
mm	Millimeter
MPPEH	Material Potentially Presenting an Explosive Hazard
MRP	Munitions Response Program
MRS	Munitions Response Site
NA	Not applicable
NAPR	Naval Activity Puerto Rico
NAVFAC LANT	Naval Facilities Engineering Command Atlantic
NAVSEA	Naval Sea System Command
NEW	Net explosive weight

NOSSA	Naval Ordnance Safety and Security Activity
NRHP	National Register of Historic Places
NSRR	Naval Station Roosevelt Roads
OB/OD	Open Burn/Open Detonation
OP	Operations Pamphlet
OPNAVINST	Naval Operations Instruction
ORM	Operational Risk Assessment
PM	Project Manager
POC	Point of Contact
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPM	Remedial Project Manager
SUXOS	Senior Unexploded Ordnance Supervisor
SWMU	Solid Waste Management Unit
TP	Technical Paper
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer

1 Background

This ESS, dated June 2012, received safety approval by DDESB on July 27, 2012. Amendment 1, dated December 2013, was approved by DDESB on February 18, 2013.

1.1 Responsible Project Manager

The responsible Project Manager (PM) for this Explosives Safety Submission (ESS) is:

Stacin Martin
Remedial Project Manager (RPM)
NAVFAC Atlantic, EV31
6506 Hampton Boulevard
Norfolk, VA 23508
Work Phone: 757-322-4780
stacin.martin@navy.mil

1.2 MRS Identifier and Description

The former United States Naval Station Roosevelt Roads (NSRR), Puerto Rico, was in use as a military base from 1943 to 2004. NSRR operated as a Naval Station until March 31, 2004, when NSRR underwent operational closure. On April 1, 2004, NSRR was re-designated as Naval Activity Puerto Rico (NAPR). Most of the former NSRR property has been disposed of under the Base Realignment and Closure (BRAC) program; however, the Munition Response Site (MRS) addressed by this explosives safety submission (ESS) amendment is still under Department of Defense (DoD) control and is expected to remain so until completion of the corrective action process under the Resource Conservation and Recovery Act (RCRA) program.

This ESS addresses Munitions Response Program (MRP) Site UXO 1, also known as Solid Waste Management Unit (SWMU) 77. The MRS is located on the Punta Medio Mundo peninsula on the northeastern boundary of NAPR, Ceiba, Puerto Rico. The overall approximate size of SWMU 77 is 66 acres.

1.3 Regional Map

Figure 1 is a regional map showing the location of NAPR and the surrounding area.

1.4 Scope of Munitions Response

The scope of the munitions response includes two primary actions:

- Construction support for soil removal being conducted as a RCRA Corrective Action interim measure to remove lead contaminated soil which may contain MEC/MPPEH.
- Site characterization being conducted as part of a RCRA Facility Investigation (RFI), including the test pitting of saturated response areas (SRA).

The planned munitions and explosives of concern (MEC) activities are as follows:

- Site preparation, including mobilization of personnel and equipment, assessment of site accessibility and traffic control, establishment of site security, and out-of-the-box tests for all survey and Global Positioning System (GPS) equipment.
- Site surveying, including marking of boundaries, approach paths, and equipment lay-down areas and also including designation of a secure treatment area inside SWMU 77.

- Vegetation management consisting of clearing vegetation as needed to support site activities.
- Conducting detector-aided visual surveys.
- Conducting geophysical surveying, as warranted, and soil sampling.
- Conduct MEC/ Material Potentially Presenting an Explosive Hazard (MPPEH) avoidance in areas not specifically designated for investigation and in support of geophysical surveys and soil sampling.
- Manual investigation of subsurface anomalies
- Use of unarmored excavator to remove 10-inch overburden after detector sweeps
- Mechanized low-input operations
    - Test pitting of saturated response areas (SRA)
    - Mechanical excavation and soil processing prior to transport and disposal offsite in areas where anomalies will not be intrusively investigated, or where mechanical excavation will be conducted to a depth greater than 10 inches following intrusive investigation of anomalies
- Donor explosives handling in support of MEC treatment.
- Investigation and removal/treatment of MEC discovered during the detector-aided surveys and intrusive investigations.
- Inspection, management, and certification of MPPEH.

NAPR is in closure under the BRAC process. SWMU 77 is currently inactive, and future land use is not firmly established, but according to the BRAC Program Management Office (PMO) Southeast, reuse of the site as a recreational corridor is tentatively planned. The site will remain under the ownership and control of the Navy until response actions are complete, and site access will remain restricted during this time. No construction or other activities are planned at SWMU 77 other than the proposed activities.

1.5 History of MEC Use

SWMU 77 was historically used for small-arms operations; however, potential munitions disposal and/or detonation operations are suspected based on historical aerial photographs and anecdotal evidence or previous investigation findings. Operations extended from 1940 to January 1, 2010. Although MEC is potentially present across all of the MRS, MEC is suspected or has been encountered in three specific areas as described below:

- **Rifle Range Subarea**. Small arms along with CS grenades and practice grenades, both civilian and military, were used during police and military training conducted in this area. These items were discovered during prior investigation on the ground surface during a detector-aided survey.
- **Potential OB/OD Subarea** is suspected of OB/OD use solely based on historical aerial photographs that indicate potential activity at two bermed areas. No MEC/MPPEH have been found on the ground surface; however, subsurface anomalies have been located that warrant investigation.
- **Potential Munitions Trench Subarea** has no documentation other than being suspected of disposal use solely based on historical aerial photographs that indicated potential activity (trenches).

No MEC/MPPEH have been found on the ground surface; however, subsurface anomalies have been located that warrant investigation.

1.6 Previous Studies of Extent of MEC or MPPEH Contamination

1.6.1 Phase I RFI (2010)

In May 2010, Tetra Tech conducted the Phase I RFI at SWMU 77 that included the Rifle Range, OB/OD, and Potential Munitions Trench subareas; the report recommended additional investigation via a Full RFI. For the Rifle Range Subarea, MPPEH items previously identified on the ground surface of the firing berm (constructed earthen berm) during a site walk for planning phase of the Phase I RFI were presumed to have been removed by the facility because they were not present during Phase I RFI field work initiation. During the Phase I RFI detector-aided survey of this subarea, MEC items were discovered on the ground surface of the firing berm (wooded embankment). These MEC items are believed to be remnants of the activity described in Section 1.5. Moreover, the detector-aided survey showed several subsurface anomalies in and around the two berms.

For the Potential OB/OD Subarea, the detector-aided survey and electromagnetic (EM) geophysical data showed several subsurface anomalies throughout the subarea, which may or may not be munitions related, considering that the anomalies may be reflective of outcrops of volcanic bedrock present at SWMU 77. Weathered bedrock was exposed at the OB/OD area land surface, particularly at steep embankments. Additionally, bedrock was encountered at shallow depths during soil sampling. Although only a limited subsurface investigation was conducted, bedrock was encountered consistently at shallow locations throughout the area. It is unlikely that subsurface disposal would have been conducted if bedrock is encountered consistently at shallow depths throughout the area. Due to the limited nature of the Phase I soil borings, additional investigation was recommended to determine if the shallow depth to bedrock is consistent throughout areas where anomalies were present.

For the Potential Munitions Trench Subarea, more than 70 subsurface anomalies were encountered during the detector-aided survey. The general locations matched those identified during the EM geophysical surveys subsequently conducted over the main suspect trench area in the eastern portion of the subarea. In the northeastern side of the subarea, lines of anomalies were identified trending northwest to southeast, aligned in the same direction as the orientation of the suspect trenches shown on the historical aerial photographs. In the western portion of the subarea, no subsurface anomalies were encountered during the detector-aided survey, and the area was too heavily wooded to conduct a geophysical survey. The sources of the subsurface anomalies detected cannot be determined from the geophysical survey alone. Moreover, anomalies are not necessarily indicative of buried metal but instead could be reflective of outcrops of naturally occurring volcanic bedrock present at SWMU 77. Weathered bedrock was exposed at the Potential Munitions Trench Subarea land surface, particularly at steep embankments, and bedrock refusal was encountered at shallow depths during soil sample collection. It is unlikely that subsurface disposal would have been conducted if bedrock is encountered consistently at shallow depths throughout the area. Due to the limited nature of the Phase I RFI soil borings, additional investigation is needed to determine if the shallow depth to bedrock is consistent throughout areas where anomalies were present.

1.6.2 Full RFI (2012)

The Full RFI included the use of geophysical equipment to locate surface and subsurface metallic items that could be MEC, MPPEH, or non-munitions related debris (Tetra Tech, 2013). Intrusive activities (hand digs and test pit trenches) were conducted at three subareas: the Rifle Range Subarea, the Potential OB/OD Subarea, and the Potential Munitions Trench Subarea.

The following MPPEH items were found at eight locations, at depths up to 8 inches below ground surface, in the Rifle Range Subarea (Tetra Tech, 2013); no additional nomenclature was provided:

- (5) 40mm practice bases
- (1) 37mm CS canister
- (1) 40mm CS grenade base
- (1) broken spent CS grenade
- (1) 25-pound practice bomb.

No MEC or MPPEH items were found on the ground surface during the Full RFI surveys. However, the following MEC/MPPEH items were subsequently identified by the unexploded ordnance (UXO) escort supporting MC sampling activities in the Rifle Range Subarea (Tetra Tech, 2013); no additional nomenclature was provided:

- MPPEH: Three 3.5-inch rockets and one 40mm CS grenade
- MEC: Two 3.5-inch rockets.

No MEC or MPPEH items were found in the Potential OB/OD Subarea or in the Potential Munitions Trench Subarea.

1.7 Justification for NDAI/NFA Decision

Not applicable (NA)

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FIGURE 1
Regional Map
Site UXO 1 (SWMU 77) - *Small Arms Range*
Naval Activity Puerto Rico
Ceiba, Puerto Rico

2 Project Dates

2.1 Project Dates

The RCRA Correction Action interim measure is scheduled to begin in February 2015. Field work is anticipated to be completed within four months of the start date. If approval of this ESS Amendment is not received prior to the start of field work, an ESS Determination Request may be made to allow site preparation activities, such as surveying and vegetation removal, to proceed. Soil removal will be delayed until approval of the ESS Amendment is received.

Site characterization activities are not yet scheduled. Work plan development is not planned to start until the RCRA Correction Action interim measure is complete.

3 Types of MEC or MPPEH

3.1 Types and Quantities of MEC and MPPEH

Expended items identified in available range records (from 2003 to 2009) include shotgun, ball, linked, and blank small arms cartridges (more than 400,000), hand smoke grenades (six), and 40-millimeter (mm) training smoke grenades (55).

During the Phase I RFI, four types of munitions were found at SWMU 77, including four M651 CS 40 Millimeter (mm) grenades, two M781 40 mm practice grenades, one civilian 37mm CS grenade, and one civilian CS hand grenade. In addition, Phase I RFI geophysical survey results indicated multiple subsurface anomalies that may be MEC/MPPEH items.

During the Full RFI, MEC or MPPEH originating from the following types of munitions items were found (Tetra Tech 2013):

- 40mm practice grenade
- 40mm CS grenade
- 37mm CS canister
- 25-pound practice bomb
- 3.5-inch rocket

3.2 Munition with the Greatest Fragmentation Distance

Evidence of MEC related to SWMU 77 includes non-fragmenting M651 40mm CS grenades, M781 40mm practice grenades, civilian Hand CS grenades, 37mm CS hand grenades, 25-pound practice bombs, and 3.5-inch Rockets. The 3.5-inch M28A2 Rocket is the largest munition found to date at this site. Therefore, the 3.5-inch M28A2 Rocket is selected as the primary munition with the greatest fragmentation distance (MGFD). Some past activities do point to the possibility that other munitions may have been disposed of at SWMU 77. Therefore, the 81-mm M56 Mortar will be the contingency MGFD for this ESS. Both munitions selected have a Fragmentation Data Review Form (FDRF) in Department of Defense (DoD) Explosives Safety Board (DDESB) Technical Paper (TP) 16, so all calculations were completed using the information contained in these forms.

TABLE 3-1
MGFDs for SWMU 77

MGFD Type	Munitions Item	HFD(1) (ft)	MFD-H(2) (ft)
Primary	3.5-inch M28A2 Rocket(2)	157	772
Contingency	81-mm M56 Mortar(2)	240	1,196

1 Hazardous Fragment Distance (HFD)
2 Maximum Fragment Distance (MFD)
3 FDRF dated August 21, 2014.

If while executing a munitions response the UXO contractor identifies a MEC item which has a greater MFDH, HFD, or K328 distance than the ESS-approved MGFD, then the Senior UXO Supervisor (SUXOS) will halt all operations, notify the UXO contractor project manager who will notify the Navy project manager who will notify NOSSA (N4).

If the identified MEC item greatest fragmentation distance (either HFD or MFD-H) is in between the primary and contingency MGFD the project manager may, with NOSSA concurrence, resume operations only after the increased protection required by the munition item found, the contingency MGFD are in place.

If any member of the UXO team or any other person in the field encounters a MEC item that has a greater MFD than that associated with the contingency MGFD for the MRS, the person discovering the item will immediately direct all operations to stop and notify the SUXOS. In turn, the SUXOS will notify the Navy Contractor's PM, who will notify the Navy RPM, who will consult with NOSSA N53/N54. An amended ESS will be submitted to NOSSA to reflect the new MGFD. Operations will resume only when the amended ESS is approved and all safeguards associated with the newly selected MGFD are in place. The change in the MGFD will be documented in the After Action Report (AAR) which will be submitted within six months of completing all munitions response actions at an MRS.

3.3 Maximum Credible Event

NA

3.4 Explosive Soil and Contaminated Buildings

Soils with MC in high enough concentrations to present an explosive hazard are not expected to be present at SWMU 77. There are no buildings within the MRS.

4 MEC and MPPEH Migration

4.1 MEC and MPPEH Migration

Migration of exposed MEC and MPPEH may occur naturally through surface soil erosion during precipitation events such as thunderstorms and hurricanes. Because SWMU 77 is heavily vegetated, migration is not anticipated to be a significant factor.

5 Detection Techniques

5.1 Detection Equipment, Methods, and Standards

The Schonstedt GA-52Cx, White's E-Series or Spectra-Series detector, Geonics EM62 MK2 with standard coil, and/or the EM-61 Mk 2 handheld (HH), or equivalent equipment, will be used during the munitions response. The Schonstedt GA-52Cx and White's Spectrum XLT are the same instruments used during the Phase I RFI surveys in 2010. Both detectors are considered industry

standard and when used in conjunction will facilitate the detection of both ferrous and non-ferrous materials.

The Schonstedt survey equipment is generally expected to detect a target item to an approximate depth of 1-foot below ground surface (bgs). The White's has reduced depth detection capabilities but has the added capability of detection of non-ferrous metals.

Geophysical survey data will then be collected by a single operator using both the Geonics EM-61 MK2 with standard coil and EM-61 MK2 handheld (HH) to address depth requirements. The EM-61 MK2 HH was selected due to its portability and ability to maneuver in vegetated areas. Although the depth of detection is suitable for typical range munitions, items in the areas being investigated have the potential to be buried at deeper depths. Therefore, the EM-61 MK2 with the standard coil will be used in areas believed to require addition depth penetration, for example, the eastern trenches in the Potential Munitions Trench Subarea. An approximate 2-foot survey width is expected for geophysical surveys; however, the lateral detection capability will be generally depending on the size, orientation, and depth of the buried item near the survey line. Larger shallower items can be detected further to the side of a survey line than smaller deeper items. Data station intervals will be determined with the suspected MEC sizes in mind to provide adequate sampling for the smallest suspected MEC sizes. These intervals are normally controlled by survey speed and acquisition rate (readings per second) but may also be controlled by a survey wheel in some cases.

To test the capabilities of the detectors, a geophysical system verification (GSV) will be established to provide rigorous quality control (QC) of the MEC geophysical survey operation. The GSV, developed by Environmental Security Technology Certification Program specifically for munitions response actions, includes two main processes, an instrument verification strip (IVS) and a production area blind seeding program. Blind seeding will be used to check for completeness and thoroughness of the detector-aided surveys, geophysical surveys, and anomaly intrusive investigations.

The IVS will be seeded by the UXO Quality Control Specialist (UXOQCS). Each seed item will be labeled with a unique identifier, photographed (open hole), and located in relation to the IVS survey ends, which will also be located.

For the IVS, the following industry standard object (ISO) seed items will be buried 10 feet apart in a horizontal orientation at the depths indicated.

Item and Burial Depth	Burial Depth
Small ISO (1-inch-D 4-inch-long pipe)	3 inches
Small ISO (1-inch-D, 4-inch-long pipe)	6 inches
Medium ISO (2-inch-D 8-inch-long pipe)	12 inches

Hazards of Electromagnetic Radiation to Ordnance tests performed on the Geonics EM61-MK2 at Naval Support Facility Dahlgren (Naval Surface Warfare Center Dahlgren, 2011) concluded that the system can be used safely, with no risk of HERO, in areas containing unexploded electrically initiated munitions.

5.2 Navigational Equipment, Method, and Standards

A Trimble GPS, or equivalent, will be used for recording MEC/MPPEH locations as well as locations of any suspect hazardous waste items (e.g., drums) and non-munitions debris encountered. In wooded areas, use of other navigational systems (e.g., tape measure and compass) may be necessary to

supplement GPS methods. Sensor data will be correlated with navigational data based on a local monument, survey marker, or other known point. These standards were established using guidance from Engineering Manual (EM) 1110-1-4009, United States Army Corps of Engineers (USACE, 2007).

A Robotic Total Station or Real-Time Kinematic Differential GPS setup with sub-foot accuracy will be used to install geophysical transects, perform DGM surveys, reacquire DGM anomalies, and mark out limits of excavation activities for the RCRA Corrective Action interim removal.

5.3 Equipment Checkout

Instruments will be checked at the start of each day of use and after each battery change, using the items buried in the IVS. If any instrument is not able to detect the IVS items, that instrument will be removed from operation until repaired and retested. The UXOQCS will record the results of the checks in the UXOQC logbook.

GPS instruments will be checked at the start of each day by direct comparison to two known reference locations. Positional accuracy will be within the manufacturer's specifications for that model GPS unit (i.e., the planned Trimble GeoXH unit is a sub-meter-accuracy instrument).

The results will be checked for accuracy and repeatability and archived by the field team. If abnormalities are discovered, corrections will be made and the process will be repeated.

5.4 Data Collection and Storage

Digitally recorded data at the site will be transferred from the GPS/field storage unit to a computer each day.

6 Response Actions

6.1 Response Technique

This section describes the approach, methods, and operational procedures to be used for site characterization and RCRA Corrective Action interim measure activities.

6.1.1 Site Preparation and Support

Surface preparation will be conducted as necessary to support detector-aided and geophysical surveys, soil removal operations, and manual and mechanized intrusive investigations. Surface preparation will consist of detector aided surface surveying, clearing vegetation and trees to within 6 inches of the ground surface, and removal of non-munitions metallic debris within equipment lay-down and work areas and access pathways. MEC/anomaly avoidance as described in Section 6.1.2 will be followed while executing this task.

The allowable limits of soil and vegetation disturbance for the RCRA Corrective Action interim measure will be surveyed and marked. For site characterization, transects may be established or the site may be divided into a network of grids, along with marking the boundary of the work area. MEC/anomaly avoidance as described in Section 6.1.2 will be used for all site survey activities.

6.1.2 MEC/Anomaly Avoidance

MEC avoidance will be utilized for site preparation activities, including vegetation removal, land surveying, and DGM tasks. MEC avoidance includes the visual observation of the ground surface by UXO Technicians prior to and during site activities, and, where needed, instrument-assisted detection using an appropriate metal detector. The instrument will be used to check inside heavy vegetation (e.g., a thick bush), if necessary, where it is not possible for the UXO Technician to visually check the area.

Anomaly avoidance will be conducted for intrusive activities where intentional contact with a subsurface geophysical anomaly source is neither intended nor necessary. Examples of activities where anomaly avoidance will be conducted include, but are not limited to, soil sampling, soil boring, placement of stakes, and installation of silt fencing for erosion control. After inspecting the ground surface to ensure no MEC/MPPEH is present, an appropriate metal detector will be used to check the location for subsurface anomalies. If an anomaly is present at the location where the ground was to be disturbed, another suitable location will be selected. If ground will be disturbed to a depth greater than 10 inches by non-armored mechanized equipment, the metal detector will be used to check for anomalies at 10-inch increments until the total excavation depth is reached.

If MEC/MPPEH is discovered during MEC/anomaly avoidance, the location will be clearly marked and field personnel will avoid the MEC/MPPEH while working in the area. If a subsurface anomaly is indicated and the intrusive activity cannot be relocated, the anomaly at that location will be cleared in accordance with the intrusive investigation procedures in this ESS.

6.1.3 Anomaly Reacquisition

Digital geophysical mapping may be conducted to determine locations of single anomalies and SRAs. MEC avoidance will be conducted as specified in Section 6.1.2.

The locations of geophysical anomalies that are identified as representing potential subsurface MEC will be reacquired using a RTK GPS, conventional Total Station survey equipment, or measurements from surveyor-established stakes. A polyvinyl chloride (PVC) flag with the unique identifier number recorded in indelible ink flag will be positioned 1-foot north of each anomaly coordinate.

6.1.4 Manual Anomaly Intrusive Investigation - Hand Digs

Anomalies will be intrusively investigated using manual intrusive techniques (hand digs). Hand digs will be performed to intrusively investigate anomalies during site investigations and during construction support for the RCRA Corrective Action interim measure.

6.1.4.1 Site Characterization

During the site characterization, hand digs will verify the presence or non-presence of MEC or MPPEH to a maximum depth of 2 feet bgs and to a three-foot radius of the anomaly coordinate.

6.1.4.2 Construction Support – Mechanical Excavation

The goal of the RCRA Corrective Action interim measure is to excavate and process lead-contaminated soil for off-site disposal. Therefore, construction support hand digs will be used for intrusive investigation to verify the presence or non-presence of MEC or MPPEH prior to mechanical excavation as needed for removal of lead-contaminated soil.

Due to the detection limits of the handheld metal detectors and the known types of munitions onsite, soil will be removed in 10-inch lifts during excavation activities. If soil removal to greater depths is required, intrusive investigation and excavation in 10-inch lifts will be repeated until the total excavation depth is reached.

To maintain a 10-inch excavation depth, a steel plate will be welded to the bucket teeth. The bottom of this steel plate will be the deepest point of soil disturbance by the bucket. A line will be painted on the outside of the bucket at a height of 10 inches above the bottom of the steel plate. This line will serve as a depth indicator for excavation to not exceed the 10-inch lift depth. This depth indicator will be monitored by the excavation observer on the ground, who will be in communication with the operator via handheld radio. The observer will also be responsible for

directing and stopping the operation at any time a safety concern is detected or when other equipment or personnel needs to approach the work area for any reason.

6.1.4.3 Manual Soil Processing

Stabilized soil that has been excavated during the RCRA Corrective Action interim measure will be transported off-site for final disposal. Prior to stabilization and off-site removal, soil will be processed to ensure removal of potential MEC and MPPEH by mechanical screening (Section 6.1.5.2) or by the following manual processing method:

> Excavated soil will be spread on the ground in a thickness of 6 inches or less, investigated, and cleared of MEC/MPPEH and other debris larger than 20 mm in size (i.e., size of smallest MEC item) by UXO Technicians. The UXO Technicians will perform a 100-percent detector-aided surface survey of the spread soil. Each UXO Technician will work with a dig team partner. After MEC/MPPEH/scrap metal is removed, the remaining soil will then be placed in the cleared soil pile. A piece of polyethylene sheeting will be placed on the ground prior to the establishment of a cleared soil pile(s) to minimize the introduction of small metallic items and small arms (less than 20 mm) and unintentional surface spreading of potentially lead-contaminated subsurface soil into clean surface soil. Excavation operations will continue in batches as described above.

6.1.4.4 Hand Dig Procedures

Each intrusive “dig team” will consist of two qualified UXO personnel including at least one UXO Technician II or higher. Dig teams will be supervised by a UXO Team Leader (UXO Technician III) who will be able to supervise up to three dig teams at one time as long as visual and verbal communications can be maintained between the UXO Team Leader and his assigned dig teams. Intrusive activities will not begin until the UXOSO has given a safety briefing, the SUXOS has given a site-specific operations briefing, communications are established, and all non-essential personnel are evacuated outside the exclusion zone (EZ). If a UXO team member discovers a suspect MEC/MPPEH item, he will: (1) call for a temporary work stoppage within the team’s work area and (2) request that the SUXOS identify and/or verify the identity of the item and the hazards associated with it.

Prior to the on-site movement of known or suspected MEC, the SUXOS and UXOSO must determine that the risk associated with movement is acceptable and that the movement is necessary for the efficiency of the activities being conducted or the protection of people, property or critical assets. In such cases, the responsible SUXOS and UXOSO must agree with the risk determination and document this decision prior to movement of the known or suspected MEC. For non-MEC MPPEH, UXO qualified personnel (i.e. a UXO Tech II) may make this determination.

Suspect MEC/MPPEH items that are not safe to move will be secured in place, and the SUXOS will coordinate for treatment of the item with a donor charge using blow-in-place (BIP) procedures.

If MEC/MPPEH are deemed safe to move, the UXO Team may transport the item(s) to a collection point established at the site by the SUXOS for recovered MEC/MPPEH that are determined safe to move and awaiting disposal. A collection point will be under the control of the SUXOS until the item has been thermally treated. The purpose of the collection point is to facilitate tracking of smaller items that are not easily seen if left in place. The Explosive Safety Quantity Distance (ESQD) arc created by the NEW for each collection point will not extend beyond that established for that site. Movement of items away from the area where work is being conducted will allow site operations to continue. The UXO Team will assign a unique name to each MEC/MPPEH item found, take a digital photograph of the item, and record the location of the item with a GPS. The MEC/MPPEH Tracking

Logs will be completed daily by the SUXOS. The UXO Team Leader will document all information in a logbook and report pertinent information to the SUXOS for inclusion in the daily report. Information documented by the UXO Team Leader will include, at a minimum, the length, width, and depth of each excavation, the location(s) excavated, and a description of each MEC/MPPEH item removed along with a general description and weight. Non-munitions items removed will likewise be recorded.

6.1.5 Low-Input Mechanized Operations

Mechanized operations are essential to excavate soil that may contain MEC/MPPEH to assist the site characterization and to perform the RCRA Correction Action interim removal.

6.1.5.1 Mechanized Anomaly Intrusive Investigation

6.1.5.1.1 Test Pitting

Test pitting operations may be performed during site characterization. The locations of the test pits will be determined based on the geophysical surveys to investigate and determine the sources of the anomaly clusters, large amplitude anomalies, and/or linear anomalies, if identified. If the presence of these anomalies is determined to be munitions related, the test pitting will also acquire data on the type, depth, and volume of munitions-related items and soil characteristics in these areas. If the water table or bedrock is encountered at a given location, test pitting will be discontinued at that depth.

Test pitting is considered an explosive operation and will follow all applicable explosive-related procedural and safety requirements. This mechanical operation is considered a mechanized (low-input) operation because of the low probability of finding MEC and because the equipment operator will employ excavation techniques that will not deform possible MEC items. The test pitting team will initially consist of, at a minimum, a UXO Team Leader, heavy equipment operator, and two UXO Technicians to remove, investigate, and clear MEC/MPPEH from the excavated material.

Upon completion of detector-aided surface surveys, surface MEC removal, and subsurface geophysical surveys, test pitting activities (to a maximum depth of 4 feet bgs) will begin with soil excavation via a hydraulic excavator or equivalent. Soil and debris contents of the excavator bucket will be spread on the ground near the excavation, investigated, and cleared of MEC/MPPEH and other debris larger than 20 mm in size (i.e., size of smallest MEC item) by UXO Technicians. During investigation and removal operations, approximately 1 cubic yard (CY) of soil will be spread on the ground at a time. The UXO Technicians will perform a 100-percent detector-aided surface survey of the spread soil. Each UXO Technician will work with a dig team partner. After MEC/MPPEH/scrap metal is removed, the remaining soil will then be placed in the cleared soil pile. A piece of polyethylene sheeting will be placed on the ground prior to the establishment of a cleared soil pile(s) to minimize the introduction of small metallic items and small arms (less than 20 mm) and unintentional surface spreading of potentially MC-contaminated subsurface soil into already cleared surface soil. Test pitting excavation operations will continue in batches as described above until the end of the work shift or until the subsurface excavation location has been characterized.

The test pitting operation at these areas is not intended to remove all MEC/MPPEH items but to acquire data on the type, depth, and volume of MEC/MPPEH within the selected subsurface excavation location. If MEC/MPPEH is observed in the excavated test pit, the operation will temporarily stop. The UXO Technicians will investigate the MEC/MPPEH item and determine if it is safe to move. Personnel will not enter a test pit greater than 4 feet deep. Procedures for MEC/MPPEH discovery and documentation described in Section 6.1.4, paragraphs 3 and 4 will be followed. The depth of each test pit will be determined in the field with the purpose of determining

the approximate depth of buried MEC/MPPEH. Unfuzed safe-to-move items will be consolidated for later donor explosive treatment. Items determined to be unsafe to move will be treated with BIP procedures.

Depending on the amount of potential MEC/MPPEH-related debris and/or metal fragments remaining, these items will be removed either by hand or by using a magnet and collected in plastic containers. Easily identifiable MPPEH will be segregated from other metallic material during this collection process. Metal debris collected and MPPEH identified will be brought to a separation area for segregation. Two UXO Technicians will separate the MPPEH from the other metal debris through visual inspection.

In the event that MEC are discovered during intrusive investigation, the SUXOS and UXOSO will be called immediately for identification and disposition. The UXO Team Leader will maintain a daily log recording, at a minimum, the length, width, and depth of the excavated test pit (and test pit corners if possible), the location(s) excavated, and a description of the MEC/MPPEH removed along with the estimated weight and estimated number of other metallic debris items. Estimated weight and number of expended cartridges and bullets (small-arms Material Documented as Safe [MDAS]) removed will also be documented. If it is not feasible to determine precisely where each item came from, the UXO Team Leader will record a general observation and description.

Upon completion of the excavation, the cleared soil will then be backfilled and compacted within the test pit area, and the area will be seeded with grass.

6.1.5.1.2 Mechanical Excavation of Soil

During the RCRA Corrective Action interim measure, there will be a large amount of soil removal. Therefore, manual anomaly investigation may not be conducted prior to soil excavation or lifts will be performed to depths greater than 10 inches. These operations will be considered low-input mechanical processing operation in accordance with the personnel protections and engineering controls defined in Section 6.1.5.3.

6.1.5.2 Mechanical Soil Screening

As necessary, mechanical screening of soil will be performed prior to off-site disposal. Excavated material will be processed through a mechanical screen using a low input method of soil/gravity flow through vibrating screens, and material retained by the screen will be inspected. The objective of the mechanical screening operation is to remove any potential MEC and MPPEH from the excavated soil.

Materials will pass through a ¾-inch screen sized to retain items 20 mm in size and greater. The screen size was selected based on items discovered in previous investigations. Items 20 mm and larger will accumulate at the collection point on the ground next the screening plant. This material will be inspected in accordance with **Section 6.4**.

A remote shutdown switch will be located a minimum of K24 distance from the mechanical screen. Prior to the start of mechanical screening operations, the equipment operator will train, demonstrate to, and oversee essential personnel in emergency shutdown procedures.

During the screening operation, non-essential and essential personnel will maintain the separation distances and protective measures as described above for excavation and material movement.

Screened items will be inspected and segregated by UXO qualified personnel (i.e., UXO Technicians III, as identified within DDESB TP-18). Recovered MEC/MPPEH will be disposed of in accordance with **Section 6.4**.

6.1.5.3 Personnel Protections/Engineering Controls

Low-input mechanized operations will be accomplished using an armored excavator or similar equipment (e.g., track hoe, backhoe, or loader). The excavation is being conducted in loose material, it is considered to be consistent with raking and, therefore, a low-input process.

During low-input mechanized operations, the public and nonessential personnel will be kept outside of the 157-foot (HFD distance for the primary MGFD) or 240-foot (HFD for the contingency item, if implemented) ESQD arc from the point of the operation.

Blast overpressure protection for essential personnel will be provided by maintaining a minimum separation distance no less than 31 feet (K24 distance for the primary MGFD) or 39 feet (K24 for the contingency item, if implemented) for essential personnel (e.g., equipment operators and UXO Technicians). However, when essential personnel use double hearing protection (i.e., ear plugs in the ear canal combined with ear muffs over the outer ear), the separation distance may be reduced to 23 feet (K18 distance for the MGFD) or 29 feet (K18 for the contingency item, if implemented). Essential personnel will use double hearing protection to allow for use of the reduced distance. Physical means, such as flagging on equipment, cones, or barricades, will be used to visibly define the separation distances.

The operator and spotter of the hydraulic excavator will need shielding from the mechanized operation. The shielding material and thickness are detailed in the DDESB FDRF found in Appendix B. Prior to beginning low-input mechanized operations each day, the UXOSO will check the excavator to ensure that the proper shielding is being used and that it is correctly installed. This check will also be made prior to resuming low-input mechanized operations after the excavator has been used for operations that do not required shielding.

6.2 Exclusion Zones

6.2.1 Exclusion Zones

An Exclusion Zone (EZ) is intended to protect non-essential persons from being exposed to hazardous blast overpressure and fragments resulting from the detonation of MEC during MEC operations. The EZs selected for the planned low-input processing operations are based on the safe distances contained in the FDRF for the primary and contingency MGFDs. These distances, presented in Table 6-1, will define the dimensions of the EZ for each MGFD. The EZ for SWMU 77 will initially be established at the HFD for the primary MGFD from the outer edge of the investigation work area. The EZ will be changed to the HFD of the contingency MGFD if an item larger than the primary MGFD, but not larger than the contingency MGFD, is found.

TABLE 6-1
EZs for SWMU 77

MGFD		EZs (ft)					
		Fragmentation Effects		Blast Overpressure Effects			
Description	NEW	HFD	MFD	K328	K40	K24	K18
3.5-in M28A2 Rocket (Primary)(2)	2.181(1)	157	772	425	52	31	23
81-mm M56 Mortar (Contingency)(2)	4.31(1)	240	1,196	534	65	39	29

1 Pounds (lbs) of TNT equivalent weight
2 FDRF dated August 21, 2014.

Figures C-1 and C-2 contained in Appendix C show the EZs expressed as ESQD arcs for the primary MGFD HFD (unintentional detonation) and MFD (intentional detonation) and the HFD (unintentional detonation) and MFD (intentional detonation) for the contingency MGFD.

Once established, the EZs will be controlled by barricades at each access point. Each barricade will be marked with the name and number of the person who can be contacted to request access, and a red Bravo flag will be displayed when UXO operations are in process.

Both routine and emergency response actions dictate the need for prevention of unauthorized site access and for the protection of vital records and equipment. All equipment will be secured and brought to a designated location at the end of each day.

6.2.2 Controlling EZs for MRSs

TABLE 6-2
Controlling EZs for SWMU 77

Operation	Sited As	ES	Basis	ESQD (ft)
Manual Operations[2]	Unintentional detonation	UXO Teams	K40 of the MGFD[1]	Primary 52 [3]
				Contingency 65[3]
	Unintentional detonation	Public and non-essential personnel	HFD of the MGFD	Primary 157[3]
				Contingency 240[3]
Mechanized (Low Input) Operations[4]	Unintentional detonation	Essential personnel	K24 of the MGFD[4,5]	Primary 31[3]
				Contingency 39[3]
	Unintentional detonation	Public and non-essential personnel	HFD of the MGFD	Primary 157[3]
				Contingency 240[3]
	Unintentional detonation	UXO Teams	HFD of the MGFD	Primary 157[3]
				Contingency 240[3]
	Unintentional detonation	Other Explosives Operations (Manual and mechanized, low input)	HFD of the MGFD	Primary 157[3]
				Contingency 240[3]
Storage of MPPEH (up to 10 lbs NEW)	Open Storage	Non-essential personnel in structures	HFD	474[6]
		Personnel in open	PTR	284[7]
Detonation of MEC (<13 lbs NEW, including donor charge[8])	Intentional detonation	Public and all personnel	MFD of the MGFD	Primary 772[3,8,9]
				Contingency 1,196[3,8,9]
MEC treatment of a single MGFD	Intentional detonation	Public and all personnel	Sandbag Mitigation[10]	Primary and Contingency 200[3, 9, 11]

1. The primary MGFD is the 3.5-inch M28A2 Rocket and the contingency MGFD is the 81-mm M56 Mortar.
2. Manual operations involve hand removal of MEC/MPPEH.
3. FDRF dated August 21, 2014.
4. Mechanized operations involve excavating anomalies with an excavator, mechanically spreading soil out in 10-in lifts, and sifting excavated soil.
5. Requires shields or barricades designed to defeat hazardous fragments from the MGFD.
6. Naval Sea System Command (NAVSEA) Ordnance Publication (OP) 5, Table 7-9 (NAVSEA, 2011)
7. PTR (public transportation route) = 60% of HFD
8. NEW for which blast overpressure (K328) does not exceed the MFD for the MGFD.
9. No CS rounds will be intentionally detonated unless directed by EOD, however if MEC is found which is free of CS, it may be intentionally detonated.
10. The required wall and roof thickness for the primary MGFD is 20 inches and the required wall and roof thickness for the contingency MGFD is 24 inches.

11. Per the FDRFs dated August 21, 2014, the required withdrawal distance for all personnel is 125 feet, however, 200 feet will be used as a conservative measure.

The NAPR magazines are decommissioned and will not be available for use. Donor explosives will be obtained from a local vendor on an as-needed basis.

6.2.3 Potential Explosion Sites Encumbering MRS

No potential explosion sites such as magazines or explosives operating buildings encumber the SWMU 77 site.

6.2.4 EZ Access Protocol

Access to each EZ will be controlled by barricades at each access point. Each barricade will have a red Bravo flag and will be marked with the name and number of the person who can be contacted to request access. Access to the EZ will be limited to personnel essential to the operation being conducted. However, under specific conditions and on a case-by-case basis, authorized visitors may be granted access to the EZ when operations are being conducted. In addition to general MRS access requirements, the following procedures addressing EZ access, including authorized visitor access, will be enforced:

a. Access to the EZ while munitions response operations are occurring is limited to essential personnel and authorized visitors.

b. The UXOSO will conduct an Operational Risk Management (ORM) assessment in accordance with OPNAVINST 3500.39 series (Department of the Navy) prior to initiating response actions involving MEC. In addition, the UXOSO will determine the maximum number of people (essential personnel and authorized visitors) that can be in the EZ at one time. The ratio of UXO-qualified escorts to visitors will be determined by the UXOSO based on this site-specific operational risk analysis.

c. Based on the risk posed by the munitions response operation underway, the UXOSO may determine that access to the EZ is unsafe for visitors. However, every effort will be made to accommodate authorized visitors' needs.

d. With the concurrence of the NAPR Point of Contact (POC) (Environmental Office), the UXOSO will grant EZ access to authorized visitors. Access to the site will be based on the operational risk analysis of the scheduled MEC operations and availability of escorts, as well as a demonstrated visitor's need and subsequent completion of a site-specific safety briefing.

e. People requiring access to the EZ must demonstrate a legitimate need for access and obtain authorization from the NAPR POC (Environmental Office) and UXOSO. At a minimum, the request for authorization will include the name of the individual requesting access, identification of emergency contacts for the individual, purpose of visit, task(s) to be performed, and rationale to support EZ access. Persons requesting access must submit their request to the NAPR POC and UXOSO prior to the proposed date of the site visit. This advanced notice will allow time for the UXOSO to support the visit request by assigning a qualified escort, conducting an operational risk analysis on the operations planned for the date of the site visit, and preparing a visitor site-specific safety briefing for the planned operations.

f. Prior to site entry, all authorized visitors must receive a site-specific safety briefing describing the specific hazards and safety procedures to be followed within the EZ for operations underway that work day. Each authorized visitor must acknowledge receipt of this briefing in writing.

g. Authorized visitors to the EZ must be escorted at all times by a UXO-qualified person.

h. Any authorized visitor that violates the established safety procedures will be immediately escorted out of the EZ and/or site for his/her own protection and to protect essential personnel working at the site.

6.3 MEC and MPPEH Hazard Classification, Storage, and Transportation

Recovered MEC shall be managed as hazard C/D 1.1. CS munitions will be managed in accordance with NAVSEA SW 073-AC-MMA-010 Change C of 10 July 2000 and OP 5 Appendix C, as hazard C/D 6.1, SCG G unless assigned differently by NOSSA (N82), and assigned an appropriate SCG. Recovered MEC will be treated the same day discovered, if possible, or secured by UXO specialists until treatment can be coordinated.

Demolition explosives (donor charge) will be obtained from a local vendor on an as-needed basis. No magazine is available for storage of explosives. Small MEC/MPPEH items discovered at Site UXO 1 (SWMU 77) and determined to be safe to move by the SUXOS and UXOQCS will be transported in a sand-filled wood container to the secure treatment area, to be designated by the SUXOS during the site survey at Site UXO 1 (SWMU 77), for treatment by donor charge. Larger MEC/MPPEH items will be secured by sandbags for transport in a vehicle with a wooden bed liner.

MPPEH will be segregated into MDAS and MEC requiring demilitarization. MDAS will be stored on site until it is transferred to a recycler. In the event that CS material documented as an explosive hazard (MDEH) is recovered the items will be packaged and shipped to Pine Bluff Arsenal for final disposition. A formal request for Interim Hazard Classification (IHC) will be submitted. All items transported will adhere to the specification set forth in the IHC. Shipping will be coordinated through the Item Inventory Manager from the Single Manger for Conventional Ammunition (SMCA) Mr. Lorin Daniels (309) 782-4387 DSN:793-4387; or with AMMOLANT (1-800-600-2666). Items identified as CS MEC/MPPEH will be handled as stated in Section 6.4.

6.4 MEC and MPPEH Disposition Process

6.4.1 MEC

Initial MEC identification will be the responsibility of the UXO Team. MEC will not be moved until a positive identification is made by a UXO Technician III and the SUXOS concurs that the item(s) can be safely moved. CS munitions that are identified as MEC will be flagged and recorded. Proper notification will be made and EOD support will be requested in all instances of chemical related MEC. The actions performed by the UXO contractor involving CS rounds will be conducted as a Level II emergency response under a temporary emergency permit. The UXO contractor must consult with EOD DET Mayport on any item that might require an Immediate Response, as defined in the Munitions Rule Implementation Policy (CS round), or is otherwise beyond their capabilities. Upon notification EOD will determine either level 1 or level 2 emergency responses. This determination will be at the sole discretion of EOD:

Level 1: EOD responds and handles all treatment and final disposition of the item.

Level 2: EOD personnel may determine that there are situations that do not require an "immediate response" but that pose an "imminent and substantial endangerment" to human health and the environment." Qualified UXO contractors will conduct Level 2 BIP treatment and final disposition response as directed by EOD and after issuance of a temporary emergency permit which is included in the RCRA Consent Order.

Items that are not safe to move will be treated by BIP procedures. If MEC are deemed safe to move, the UXO Team may transport the item(s) to the secure treatment area (within the SWMU 77 work

area) where it (they) will be treated by the end of the work day, if possible. The treatment area will be under the control of the SUXOS until the item has been treated. If an item cannot be treated on the day it is discovered, security of the item will be maintained until the item can be treated.

During the initial site survey, the SUXOS will select a location for the secure treatment area inside the planned investigation area. The SUXOS will select a site where the ESQD arc does not exceed the intentional detonation arcs depicted in Appendix C.

The secure treatment area will be cleared of vegetation to minimize the chance of a fire during disposal operations. The secure treatment area will also be cleared of all metal debris to eliminate the chance of frag from an unknown source.

If the intentional detonation ESQD arc extends out into the water for the location where an item is being treated, security will be maintained in the exclusion zone in the offshore during treatment operations.

If a single MGFD item is to be intentionally detonated the single sandbag mitigation may be used to reduce the MFD to 200 feet based on U.S. Army Corps of Engineers, Huntsville Center (USAESCH), Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNCED- CS-S-98-7, dated August 1998 and approved by DDESB on February 23, 1999 (USAESCH, 1998).

If a MEC item is located that cannot be identified, Navy Contractor personnel will notify the NAPR POC and the Navy RPM, who will notify EOD DET Mayport and request their assistance with proper identification of the suspect item(s).

6.4.2 MPPEH

MPPEH will be visually inspected and independently re-inspected for explosives hazards in accordance with the requirements of Department of Defense Issuance (DoDI) 4140.62 (DoDI, 2008), Department of Defense (DoD) 4160.21-M, Chapter 4, Paragraph B (DoD, 1997), and OP-5 Volume 1, Chapters 13–15 (NAVSEA, 2011).

Only UXO-qualified personnel will perform these inspections. A UXO Technician III will perform the 100 percent inspection and document that the MPPEH is free of explosive hazards. Per OP-5, Section 13-15.7.2 (NAVSEA, 2011) and/or DoDI 4140.62 (DoDI, 2008), the UXOQCS will conduct the re-inspection and document that the MPPEH is free of explosive hazards. With these two visual inspections, the MPPEH becomes MDAS.

Persons certifying and verifying MDAS will be designated in writing to the Naval Facilities Engineering Command Atlantic (NAVFAC LANT) Commanding Officer (CO) as qualified and certified to do so. MDAS will be secured in a locked/sealed container, with the key/seal number held only by the SUXOS. The locked and sealed container will remain at the treatment area until released to the recycler. MDAS will be managed at all times in such a manner as to prevent it from being:

- Commingled with MPPEH or MEC
- Misidentified as MPPEH or MEC after it has been determined to be safe

All scrap metal originating from MEC and MPPEH treatment will be assessed as safe by visual inspection which requires a 100% inspection by one individual, followed by an independent 100% re-inspection by another qualified individual then the MDAS must be segregated in a location with controlled access and will then be transferred to a recycler for final disposition. Prior to being turned over for recycling, the MDAS will be demilitarized, as necessary, by crushing the item with mechanized equipment on site or by treating the item with an explosive charge.

A chain-of-custody form will be maintained for MDAS, and the proper documentation must be completed and signed by the responsible personnel (SUXOS and UXOQCS) before MDAS is turned over to the recycler. DD Form 1348-1 (series) will be used as 100% inspection/100% re-inspection documentation. As part of the transfer of MDAS to an off-Base facility for final disposition, the following statement will be entered on each DD Form 1348-1 (series) and will be signed and dated by the SUXOS and the UXOQCS: "The material listed on this form has been inspected or processed by DDESB-approved means, as required by DOD policy, and to the best of my knowledge and belief does not pose an explosive hazard."

A certificate of MDAS destruction will be provided to the UXO Contractor by the recycler or disposal facility.

Detailed guidance on the policy and responsibilities for the management and disposition of MPPEH is located in NAVSEA OP 5, Chapters 13 to 15.

6.5 Explosively Contaminated Soil

There is no known explosively contaminated soil at this site.

6.6 Contaminated Buildings

There are no known explosive-contaminated buildings or installed equipment at this site.

6.7 Operational Risk Management

MEC/MPPEH has been found at SWMU 77 in the berm areas of the Rifle Range Subarea and is suspected to be in the subsurface of the Potential OB/OD and Potential Munitions Trench Subareas. Using OPNAVINST 3500.39, ORM, and the above factors, the Mishap Probability is judged to be "C" (may occur in time) and the Hazard Severity from any resulting MEC detonation is "II" (may cause severe injury). The resulting Risk Assessment Code is "3" (Moderate). Table 6-4 provides the hazard analysis matrix.

TABLE 6-3
Hazard Analysis Matrix for SWMU 77

Process Step	Hazard	Triggering Event	Initial Risk Index	Hazard Mitigation	Final Risk Index
1	Manual MEC operations	MEC reacts to impact or movement during removal	C/II/3	Clear soil around the items by hand to avoid incidental contact.	D/IV/5
2	Mechanized (Low-Input) operations	MEC reacts to unintentional impact during excavation operations	C/II/3	Equipment performing excavation of test pit. Equipment will require shielding	C/IV/5
3	Receipt, handling, and holding of donor charges(1)	Donor reacts to impact, heat, friction, or electro-static discharge	C/II/3	All personnel will wear cotton clothing; detonation operations will not take place if an electrical storm is within 6 miles	D/II/4
43	Recovered MEC treatment by detonation	MEC and donor charges react to impact, heat, friction, or electro-static discharge	C/II/3	All detonation operations personnel will be properly trained; the EZ will be established; all personnel will wear cotton clothing; detonation operations will not take place if an electrical storm is within 6 miles	D/II/4
4	Discovery of CS munition	CS round reacts to impact, heat friction.	C/II/3	All personnel will carry escape Masks to be donned in the event of a chemical release.	D/II/4

1 No donor charges will be stored on-site. All donor material will be received, stored, and transported by licensed local supplier IAW Federal and Puerto Rico Explosive Law.

6.8 Contingencies

NA

7 Quality Control/Quality Assurance

7.1 QC Implementation

The UXOQCS will monitor and record the results of equipment checks.

- The UXOQCS will be responsible for placing blind seeds during detector-aided surveys, geophysical surveys, and mechanical and manual intrusive operations. The UXOQCS will place seeds at the rate of one to six seeds per daily lot of work for each definable feature of work. If a seed is not found, that portion of the daily allotted work will be reworked by the team conducting the task, and QC will be performed again. Additional details for the placing of blind seeds are as follows:

- During detector-aided surveys, the seeds will be placed in vegetation for concealment or under a tuft of grass if natural vegetation is not available.

- For geophysical surveys, the seeds will be buried in the area selected for surveying at depths no deeper than the seeds in the IVS.

- For manual MEC operations, seeds will be placed in a clear space, no more than 2 feet from pin flags marking the locations of anomalies found during geophysical surveys.

- For mechanical MEC operations, seeds will be added to the planned test pit excavation.

The results of all QC check documentation will be maintained in the UXOQC logbook. The quality of each definable feature of work will documented using a Preparatory, Initial, and Follow-up Phase inspection.

The UXOQCS will be responsible for implementing the QC Plan, an appendix of the Work Plan, and performing peer oversight, inspections, and audits in accordance with pass/fail criteria. The pass-fail criteria identified in Table 7-1 are the basis for conformance and non-conformance with accomplishing scope objectives. The achievement of each pass criterion with zero failures enables the next phase of the process to progress.

7.2 QA Implementation

NAVFAC LANT will provide quality assurance (QA) oversight. Navy QA personnel will be granted site access by appropriate personnel under the direct supervision of the SUXOS or UXOQCS. The QA personnel will comply with all applicable training, safety briefings, and site security procedures. The Navy QA Manager will conduct an audit based on NOSSA audit standards using his own QA checklist to evaluate the quality of the process. During the audit, each lot that passes QA will be accepted by the Navy representative with a signature on the QC Report for that lot. Any lot that fails QA will be returned to the SUXOS for rework, QC checks, and QA re-evaluation. Lots not evaluated during the QA process will be presumed to have been accepted.

TABLE 7-1
QC Methods and Pass/Fail Criteria
Explosives Safety Submission for UXO 2
NAPR

Operation	Inspection	Audit	Pass/Fail Criteria
Site Preparation	Conforms to Work Plan, SOPs, QCP.	Locations of site boundaries, MPPEH Holding Area, barricades and entry control points	In accordance with (IAW) Work Plan criteria and the ESS site plan.
Instrument validation	Conforms to Work Plan, SOPs, QCP.	Checkout and, operation of geophysical Instruments (including documentation)	100% pass of daily equipment checkout test
Site boundary, grid placement, and/or transect placement	Conforms to Work Plan, SOPs, QCP.	equipment checkout against known control monument for vertical and horizontal accuracy	Site boundaries, work area, and grid/transect stakes achieve centimeter tolerance for traverse closure.
Vegetation Management	Conforms to Work Plan, SOPs, QCP.	Anomaly avoidance provided by UXO technicians. Personal protective equipment worn IAW the Health and Safety Plan	Brush cut to no more than 6 inches above surface.
Manual Anomaly Intrusive Investigation – Hand Digs	Conforms to Work Plan, SOPs, QCP.	At least 10% inspection of DGM identified anomalies	Failure to recover metal equal to or larger than 40-mm in diameter or MEC at a subsurface anomaly Failure to recover QC seed
Low-input mechanical operations	Conforms to Work Plan, SOPs, QCP.	In accordance with Activity Hazard Analysis Controls and Work Plan	Not characterizing subsurface debris DGM selected test pits. Metal equal to or larger than 40-mm in diameter or MEC not being identified in excavated soil Failure to recover QC seed
MPPEH processing	Conforms to Work Plan, SOPs, QCP.	MPPEH holding area and processing is IAW Work Plan. MDAS are properly documented and a chain of custody maintained. 100% verification of demilitarization methods to achieve a determination of releasable to a recycler	100% of all MDAS has been properly assessed and documented as safe. Re-inspect and document any discrepant material. Visual inspection of all surface areas, demilitarization in accordance with DoD Instruction 4140.62.
Intentional detonations	Conforms to Work Plan, SOPs, QCP.	100% oversight during explosive operations set-up, execution, and post investigation	Explosive main charge fails to detonate, or fragments are thrown beyond ESQD arcs.

8 Technical Support

8.1 EOD

Emergency EOD support will be provided by Navy EOD Det Mayport. Their telephone number is 904-270-5412.

8.2 UXO Contractor

UXO Technicians performing the on-site UXO operations described in this ESS will be provided by a Navy Contractor. All UXO technicians, geophysicists, and geophysical instrument operators will meet or exceed the qualifications as stated in DDESB TP-18 (2004) and NOSSAINST 8020.15D, Enclosure 3, Paragraph 8.2.

8.3 Physical Security

Because all recovered MEC are explosive items, the requirements associated with Arms, Ammunition, and Explosives physical security will be met. Recovered MEC that are not treated as they are recovered or treated at the end of the day, and discovered MEC items that are not safe to move and cannot be treated on the same day discovered, will be secured by the Navy Contractor until treated or shipped.

9 Environmental, Ecological, Cultural, and/or Other Considerations

9.1 Regulatory Statute, Phase, and Oversight

RCRA is the regulatory statute governing the cleanup of SWMU 77. Site characterization is being conducted under the RFI/CMS phase of the RCRA Corrective Action process. Soil removal is being conducted as a RCRA Corrective Action interim measure.

9.2 Environmental, Ecological, Cultural, and/or Other Considerations

Three locations (RR-9, RR-10, and RR-11) within SWMU 77 have previously been identified as archeological sites and have been under investigation. These locations are not shown on figures to safeguard the locations from looters, but all work will be planned so as to ensure that the areas are not disturbed as part of the work efforts. The Puerto Rico SHPO has concurred with the Navy's findings that RR-9 is eligible for the National Register of Historic Places (NRHP) and that RR-10 and RR-11 are not eligible for the NRHP.

The facility supports one plant (*Cobana negra*) that was classified as threatened in 1990 by the United States Fish and Wildlife Services (USFWS). The black mangrove (*Avicennia germinans)* is classified as threatened under federal law. Because the mangrove areas are considered wetlands, they are conservation zones protected under federal law and are critical habitat for the endangered yellow-shouldered blackbird (*Agelaius xanthomus*).

Because of its island ecosystem, abundant and diverse species of terrestrial vertebrates are not found on Puerto Rico. The facility supports a variety of wildlife that have been listed by either the federal or Commonwealth government as threatened, endangered, or vulnerable (Commonwealth only), including five sea turtle species [green (*Chelonia mydas)*, loggerhead (*Agelaius xanthomus)*, hawksbill (*Eretmochelys imbricate*), leatherback (*Dermochelys coriacea)*, and olive ridley (Lepidochelys olivacea)], one snake [Puerto Rican boa constrictor (*Epicrates inornatus)*], 12 birds [including the yellow-shouldered blackbird and brown pelican (*Pelecanus occidentalis occidentalis)*]; and one mammal [West Indian manatee (*Trichechus manatus*)]. The species

observed at the facility that are classified as endangered under federal law, any of which could be present within the boundary of SWMU 77, include hawksbill and leatherback sea turtles, Puerto Rican boa, yellow-shouldered blackbird, brown pelican, and West Indian Manatee.

The major mammal population in and near NAPR consists of introduced species such as stray dogs and cats, Norway and gray-bellied rats, mice, and mongooses. The reptile population (especially snakes) has been significantly reduced because of the large mongoose population.

Thirteen species of bats are known to occur on Puerto Rico. None of the bats found on Puerto Rico are exclusive to the island, nor are they listed under provisions of the Endangered Species Act of 1973. The bat species known to occur on Puerto Rico include the following:

- Fruit-eating bats: Jamaican fruit bat (Artibeus jamaicensis), Antillean fruit bat (*Brachyphylla cavernarum*), and red fig-eating bat (*Stenoderma rufum*).
- Nectivorous bats: brown flower bat (*Erophylla sezekoni bombifrons*) and greater Antillean long-tongued bat (*Monophyllus redmani*).
- Insectivorous bats: Antillean ghost-faced bat (*Mormoops blainvillii*), Parnell's mustached bat (*Pteronotus parnellii*), sooty mustached bat (*Pteronotus quadridens*), big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), velvety free-tailed bat (*Molossus molossus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*).
- Piscivorous bats: Mexican bulldog bat (*Noctilio leporinus*).

9.3 Non-Explosives Soil

Non-explosives soil (i.e., soil with concentrations that do not present an explosive hazard) will not be generated.

10 Residual Risk Management

10.1 Land Use Controls

NA

10.2 Long-Term Management

NA

11 Safety Education Program

11.1 Safety Education Program

NA

12 Stakeholder Involvement

The lead organization is the NAVFAC LANT. Stakeholders include United States Environmental Protection Agency (USEPA) Region 2 and the Puerto Rico Environmental Quality Board. Planning documents for all work conducted at the MRS will be reviewed and accepted by USEPA and PREQB prior to the start of onsite activities.

13 Appendices

Appendix A – Signature Page
Appendix B – Fragmentation Data Review Forms
Appendix C – ESQD Maps

14 References

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Appendix A
Signature Page

Table A-1. Signature page

NAVFAC Project		BRAC PMO Project	
Project name:		Project name: Site Characterization and RCRA Corrective Action Interim Measure Construction Support, Site UXO 1 (SWMU 77) - Small Arms Range, Naval Activity Puerto Rico	
Explosives Safety Officer or UXO Contractor Safety Officer*		**Explosives Safety Officer or UXO Contractor Safety Officer****	
		George DeMetropolis Digitally signed by George DeMetropolis DN: cn=George DeMetropolis, o=CH2M HILL, ou=CH2M HILL, email=George.DeMetropolis@ch2m.com, c=US Date: 2015.02.03 21:51:28 -05'00'	
Signature		Signature George DeMetropolis	2/3/15
Printed name	Date	Printed name	Date
PWO		**BRAC Environmental Coordinator**	
		BURGIO.PAUL.F.1229034460 Digitally signed by BURGIO.PAUL.F.1229034460 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=BURGIO.PAUL.F.1229034460 Date: 2015.02.09 11:45:29 -05'00'	
		Signature Paul F. Burgio	2/9/15
Printed name	Date	Printed name	Date
Navy Project Manager		**Navy Project Manager**	
		MARTIN.STACIN.R.1391434553 Digitally signed by MARTIN.STACIN.R.1391434553 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=MARTIN.STACIN.R.1391434553 Date: 2015.02.09 12:12:26 -05'00'	
Signature		Signature Stacin Martin	2/9/15
Printed name	Date	Printed name	Date

*This must be signed by the cognizant ESO when the munitions response actions are being executed on active Navy facilities.

**This may be signed by either the Navy Regional ESO or a technically qualified explosives safety official designated by the BRAC PMO.

Appendix B
Data Fragmentation Review Forms

Fragmentation Data Review Form

Database Revision Date 8/21/2014

Category:	Surface-Launched HE Rounds
Munition:	3.5 in M28A2 Rocket
Case Material:	Steel, Mild
Fragmentation Method:	Naturally Fragmenting
Secondary Database Category:	Rocket
Munition Case Classification:	Robust

DODIC:	H600
Date Record Created:	9/21/2004
Record Created By:	MC
Last Date Record Updated:	9/14/2011
Individual Last Updated Record:	SDH
Date Record Retired:	

Munition Information and Fragmentation Characteristics

Explosive Type:	Composition B
Explosive Weight (lb):	1.88
Diameter (in):	3.5000
Cylindrical Case Weight (lb):	1.00688
Maximum Fragment Weight (Intentional) (lb):	0.0054
Design Fragment Weight (95%) (Unintentional) (lb):	0.0007
Critical Fragment Velocity (fps):	9261

Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):	157
MFD-H [Maximum Fragment Distance, Horizontal] (ft):	772
MFD-V [Maximum Fragment Distance, Vertical] (ft):	628

Overpressure Distances

TNT Equivalent (Pressure):	1.16
TNT Equivalent Weight - Pressure (lbs):	2.181
Unbarricaded Intraline Distance (3.5 psi), K18 Distance:	23
Public Traffic Route Distance (2.3 psi); K24 Distance:	31
Inhabited Building Distance (1.2 psi), K40 Distance:	52
Intentional MSD (0.0655 psi), K328 Distance:	425

Note: Per V5.E3.2.2.1 of DoD 6055.09-M the minimum sited K328 distance may be no smaller than 200 ft.

Sandbag and Water Mitigation Options

TNT Equivalent (Impulse):	1.14
TNT Equivalent Weight - Impulse (lbs):	2.143
Kinetic Energy 10^6 (lb-ft²/s²):	0.2307

Single Sandbag Mitigation

Required Wall & Roof Thickness (in)	20
Expected Max. Throw Distance (ft):	125
Minimum Separation Distance (ft):	125

Double Sandbag Mitigation

Required Wall & Roof Thickness (in)	Not Permitted
Expected Max. Throw Distance (ft):	Not Permitted
Minimum Separation Distance (ft):	Not Permitted

Water Mitigation

Minimum Separation Distance (ft):	264/200
Water Containment System:	5 gal carboys/ inflatable pool

Note: Use Sandbag and Water Mitigation in accordance with all applicable documents and guidance. If a donor charge larger than 32 grams is utilized, the above mitigation options are no longer applicable. Subject matter experts may be contacted to develop site specific mitigation options.

Minimum Thickness to Prevent Perforation

	Intentional	Unintentional
4000 psi Concrete (Prevent Spall):	5.80	2.43
Mild Steel:	0.96	0.42
Hard Steel:	0.79	0.35
Aluminum:	2.08	0.96
LEXAN:	5.15	3.10
Plexi-glass:	3.56	1.81
Bullet Resist Glass:	2.82	1.33

Item Notes

Distribution authorized to the Department of Defense and U.S. DoD contractors only for Administrative-Operational Use (17 October 2002). Other requests shall be referred to the Chairman, Department of Defense Explosives Safety Board, Room 856C, Hoffman Building I, 2461 Eisenhower Avenue, Alexandria, VA 22331-0600.

Fragmentation Data Review Form

Database Revision Date 8/21/2014

Category:	Surface-Launched HE Rounds
Munition:	81 mm M56
Case Material:	Steel, Mild
Fragmentation Method:	Naturally Fragmenting
Secondary Database Category:	Mortar
Munition Case Classification:	Non-Robust

DODIC:	
Date Record Created:	9/21/2004
Record Created By:	MC
Last Date Record Updated:	9/14/2011
Individual Last Updated Record:	SDH
Date Record Retired:	

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	4.31
Diameter (in):	3.1890
Cylindrical Case Weight (lb):	3.77074
Maximum Fragment Weight (Intentional) (lb):	0.0263
Design Fragment Weight (95%) (Unintentional) (lb):	0.0034
Critical Fragment Velocity (fps):	7384

Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):	240
MFD-H [Maximum Fragment Distance, Horizontal] (ft):	1196
MFD-V [Maximum Fragment Distance, Vertical] (ft):	960

Overpressure Distances

TNT Equivalent (Pressure):	1
TNT Equivalent Weight - Pressure (lbs):	4.310
Unbarricaded Intraline Distance (3.5 psi), K18 Distance:	29
Public Traffic Route Distance (2.3 psi); K24 Distance:	39
Inhabited Building Distance (1.2 psi), K40 Distance:	65
Intentional MSD (0.0655 psi), K328 Distance:	534

Note: Per V5.E3.2.2.1 of DoD 6055.09-M the minimum sited K328 distance may be no smaller than 200 ft.

Sandbag and Water Mitigation Options

TNT Equivalent (Impulse):	1
TNT Equivalent Weight - Impulse (lbs):	4.310
Kinetic Energy 10^6 (lb-ft²/s²):	0.7158

Single Sandbag Mitigation

Required Wall & Roof Thickness (in)	24
Expected Max. Throw Distance (ft):	125
Minimum Separation Distance (ft):	125

Double Sandbag Mitigation

Required Wall & Roof Thickness (in)	Not Permitted
Expected Max. Throw Distance (ft):	Not Permitted
Minimum Separation Distance (ft):	Not Permitted

Water Mitigation

Minimum Separation Distance (ft):	200
Water Containment System:	1100 gal tank

Note: Use Sandbag and Water Mitigation in accordance with all applicable documents and guidance. If a donor charge larger than 32 grams is utilized, the above mitigation options are no longer applicable. Subject matter experts may be contacted to develop site specific mitigation options.

Minimum Thickness to Prevent Perforation

	Intentional	Unintentional
4000 psi Concrete (Prevent Spall):	8.02	3.43
Mild Steel:	1.41	0.63
Hard Steel:	1.15	0.51
Aluminum:	2.92	1.37
LEXAN:	6.69	4.06
Plexi-glass:	5.05	2.60
Bullet Resist Glass:	4.20	2.01

Item Notes

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Appendix C
ESQD Maps

VICINITY MAP

LEGEND

- MPPEH Holding Area
- Barricade
- Unintentional Detonation, Public and Non-Essential Personnel (157 ft)
- Intentional Detonation, All Personnel (772 ft)
- MPPEH Holding Area PTR ESQD (284-ft)
- MPPEH Holding Area HFD ESQD (474-ft)
- Site UXO 1 (SWMU 77) MRS Boundary

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February 2015

Notes:
1. Imagery 2010 - ArcMap Streaming Map Service

N

0 150 300 600
Feet

FIGURE C-1
Primary MGFD Explosives Safety Quantity-Distance (ESQD) Arcs
Site UXO 1 (SWMU 77) – Small Arms Range
Naval Activity Puerto Rico
Ceiba, Puerto Rico

VICINITY MAP

LEGEND

- MPPEH Holding Area
- Barricade
- Unintentional Detonation, Public and Non-Essential Personnel (240 ft)
- Intentional Detonation, All Personnel (1,196 ft)
- MPPEH Holding Area PTR ESQD (284-ft)
- MPPEH Holding Area HFD ESQD (474-ft)
- Site UXO 1 (SWMU 77) MRS Boundary

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Notes:
1. Imagery 2010 - ArcMap Streaming Map Service

N

0 250 500 1,000
Feet

FIGURE C-2
Contingency MGFD Explosives Safety Quantity-Distance (ESQD) Arcs
Site UXO 1 (SWMU 77) – Small Arms Range
Naval Activity Puerto Rico
Ceiba, Puerto Rico