KAFB 06

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

FEDERAL EXPRESS

12 Oct 06

MEMORANDUM FOR MR. WILLIAM C. OLSON, CHIEF
GROUNDWATER QUALITY BUREAU (GWQB)
NEW MEXICO ENVIRONMENT DEPARTMENT (NMED)
PO BOX 26
SANTA FE, NM 87502

RECEIVED OCT 2006 NMED Ground Water Quality Bureau

FROM: 377 MSG/CEVR
2050 Wyoming Blvd SE, Suite 118
Kirtland AFB NM 87117-5270

SUBJECT: Work Plan Interim Remedial Action Operation, Nitrate Abatement Ponds (Golf Course) Repair at WP-026 and ST-105, Kirtland AFB (KAFB), New Mexico

1. The Environmental Management (EM) Branch at Kirtland AFB is submitting two copies of the subject report, including one electronic copy with each document. One copy is being submitted to your office, and one copy is being submitted to Mr. Baird Swanson of your staff.

2. Please contact me at 505-853-6534 or Rob Warder at 505-853-0012 if you have any questions or comments on this matter.

CARL J. LANZ, P.G.
Chief, Restoration Section

Attachments:
1. Work Plan Interim Remedial Action Operation, Nitrate Abatement Ponds (Golf Course) Repair at WP-026 and ST-105
2. Electronic copies of Work Plan Interim Remedial Action Operation, Nitrate Abatement Ponds (Golf Course) Repair at WP-026 and ST-105

cc:
NMED GWQB, Mr. Swanson w Atchs
NMED HWB, Mr. Kieling wo Atchs
NMED HWB, Mr. McDonald w Atchs
USEPA-Region 6 (6PD-N), Ms. King w Atchs
HQ AFMC/A7CVQ, Mr. Fort wo Atchs
USACE, Mr. Martell wo Atchs
Tetra Tech, Ms. Moss wo Atchs
Admin. Record, CNM, Montoya Campus w Atch 2 only
AR/IR w Atch 2 only
File

KAFB3042

KIRTLAND AIR FORCE BASE

Work Plan Interim Remedial Action—Operation Nitrate Abatement Ponds (Golf Course) Repair at WP-026 and ST-105 Kirtland Air Force Base, New Mexico

September 2006

377 MSG/CEVR
2050 Wyoming Blvd SE
Kirtland AFB, New Mexico 87117-5270

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

WORK PLAN
INTERIM REMEDIAL ACTION–OPERATION
NITRATE ABATEMENT PONDS (GOLF COURSE) REPAIR AT WP-026 AND ST-105
KIRTLAND AIR FORCE BASE, NEW MEXICO

September 2006

Prepared for
U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

Project No. MHMV 06-7037
Task Order 0003

Prepared by
Tetra Tech EC, Inc.
143 Union Boulevard, Suite 1010
Denver, Co 80228

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AHA	Activity Hazard Analysis
CQCP	Contractor Quality Control Plan
ft	foot or feet
GCMP	Golf Course Main Pond
HDPE	high-density polyethylene
HSO	Health and Safety Officer
in	inches
IRA–O	Interim Remedial Action–Operation
O&M	Operations and Maintenance
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
QCSM	Quality Control System Manager
SB	Small Business
SDB	Small Disadvantaged Business
SHSP	Site Health and Safety Plan
TEP	Texas Environmental Plastics, Ltd.
USACE	United States Army Corps of Engineers
USAF	United States Air Force

1. PROJECT OBJECTIVE AND BACKGROUND

This Work Plan describes the Nitrate Abatement Pond (Golf Course) repair activities that will be performed under the Interim Remedial Action–Operation (IRA–O) at WP-026 and ST-105, Kirtland Air Force Base (AFB), New Mexico.

1.1 Objectives and Project Description

The main objective of this project is to repair over 600 lineal feet (ft) of high-density polyethylene (HDPE) liner system along the banks of the Golf Course Main Pond (GCMP). The repair activities at the GCMP will consist of the following steps:

- Clear and grub excess vegetation.
- Repair the 40-mil HDPE liner.
- Replace riprap over exposed portions of the liner system.

Construction activities are also planned to re-condition five small nitrate abatement ponds at the golf course. The ponds cover approximately 2.1 acres total. Construction activities at the group of five smaller ponds will be conducted in the following steps:

- Clear and grub excess vegetation.
- Re-grade bottom surface and side slopes of ponds.
- Install new 40-mil HDPE liner in the four smaller ponds.
- Replace the liner system in the fifth pond with 40-mil HDPE.
- Place protective riprap along the pond surfaces and sidewalls. Backfill and compact anchor trenches and top with rounded riprap.
- Replace the below-grade fill lines in all five ponds with above-grade fill lines in order to remove the fill pipe liner penetrations.

Additionally, a comprehensive site-wide Operations and Maintenance (O&M) plan will be developed for the GCMP and five smaller nitrate abatement ponds that specify 1 year of O&M activities.

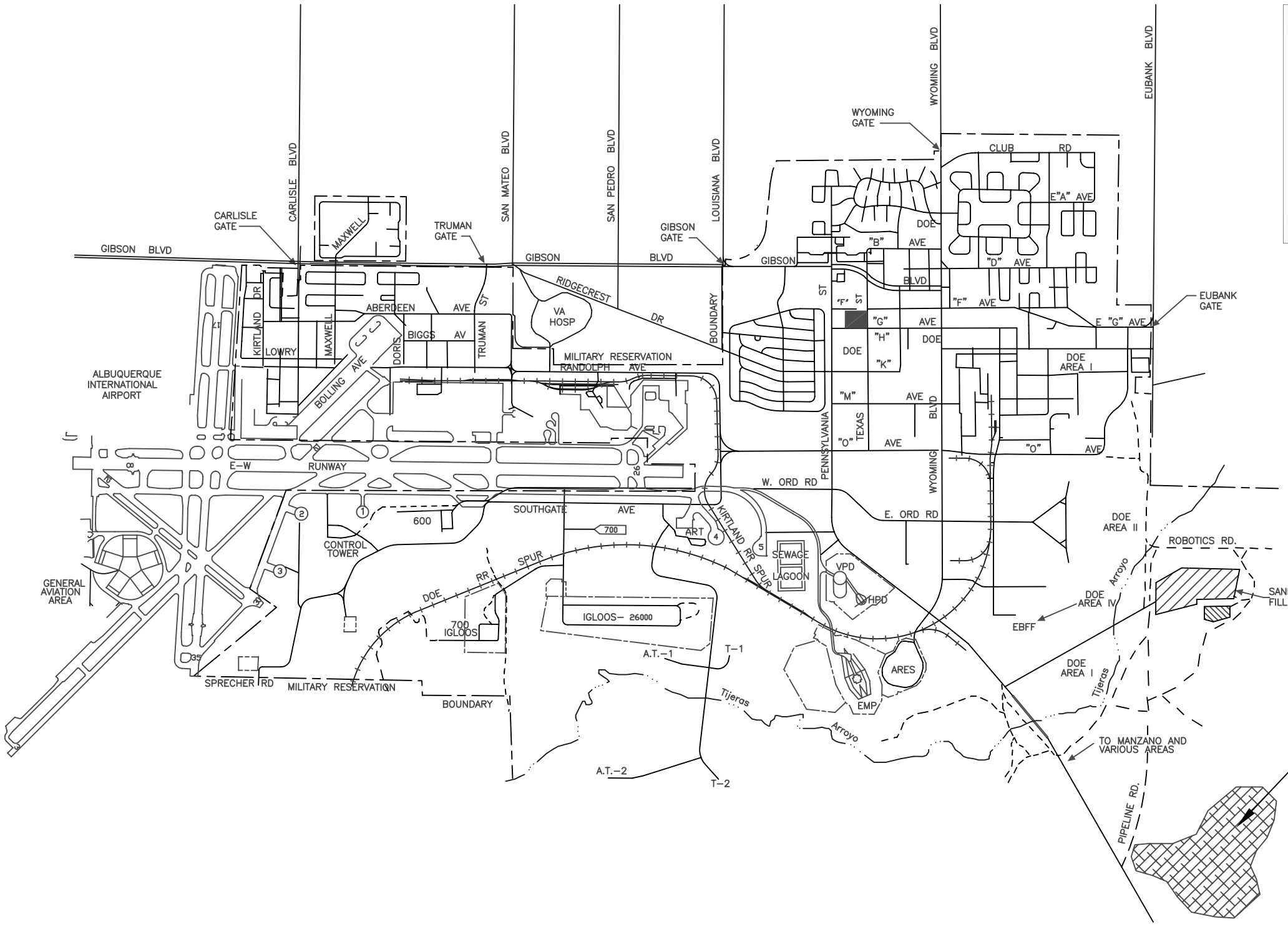
1.2 Project Background

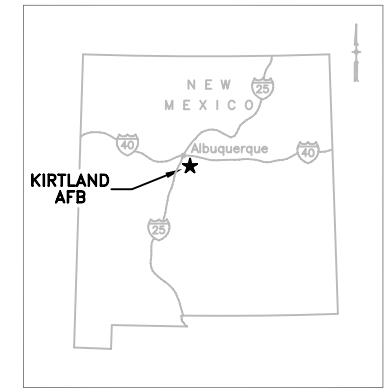
Kirtland AFB is an active United States Air Force (USAF) base located in the southeast quadrant of Albuquerque, New Mexico (Figure 1-1). The base is the third largest installation in the Air Force Materiel Command, covering 51,588 acres and employing over 23,000 people, including more than 4,200 active duty and 1,000 Guard, plus 3,200 part-time Reserve personnel. The installation is home to the Nuclear Weapons Center and the 377th Air Base Wing, one of Kirtland AFB's host organizations.

The GCMP and five smaller ancillary ponds are part of the WP-026 and the ST-105 Nitrate Abatement Program. The ponds are used to capture and recover nitrate-contaminated groundwater in the immediate area of the golf course. Water stored in the ponds is applied to the course via the site's irrigation system.

It is highly likely that 1) the existing 40-mil HDPE liner installed in the GCMP has been compromised by tree growth along the water line, and 2) excessive vegetation growth at four of the five smaller ponds has compromised the liners. The fifth and smallest pond does not have tree or vegetation growth associated with it and has a 30-mil HDPE liner installed. Because of these conditions, it is possible that nitrate-contaminated water has been discharged to the subsurface.

The GCMP is located in the northwestern portion of the Tijeras Arroyo Golf Course, between Fairways 3 and 4, approximately 100 ft east of the main Golf Course maintenance building. The Tijeras Arroyo Golf Course lies 3 miles south of the East Operations Area, northwest of the Manzano Base area and north of the riding stables. Six nitrate abatement ponds are located at the site. The five smaller ponds receive waters from the GCMP and are located throughout the golf course. Ponds one and two are due southeast of the main pond, in the middle and southeastern portion of the golf course. Ponds three and four are due east of the GCMP. The fifth and smallest is immediately south of the GCMP. The pond locations are illustrated in Figure 1-2. A more accurate configuration of the GCMP is illustrated in Figure 1-3.





LEGEND

KIRTLAND AFB PROPERTY BOUNDARY

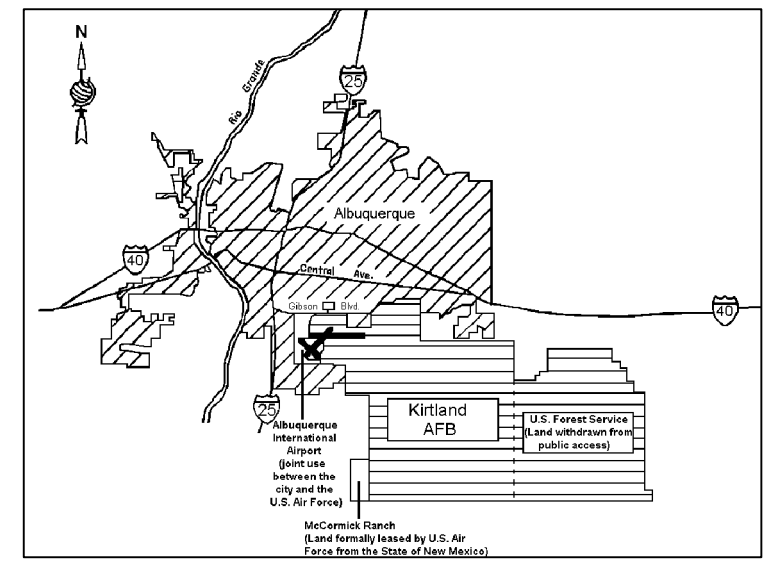
PROPERTY LEASED BY KIRTLAND AFB OR USED THROUGH OTHER AGREEMENT

RAILROAD

ROADS

0 1500 3000

1"=3000' GRAPHIC SCALE



$$ – THINK VALUE ENGINEERING – $$

REVISIONS

SYMBOL	DESCRIPTIONS	DATE	APPROVED

TETRA TECH EC, INC. ALBUQUERQUE, NM

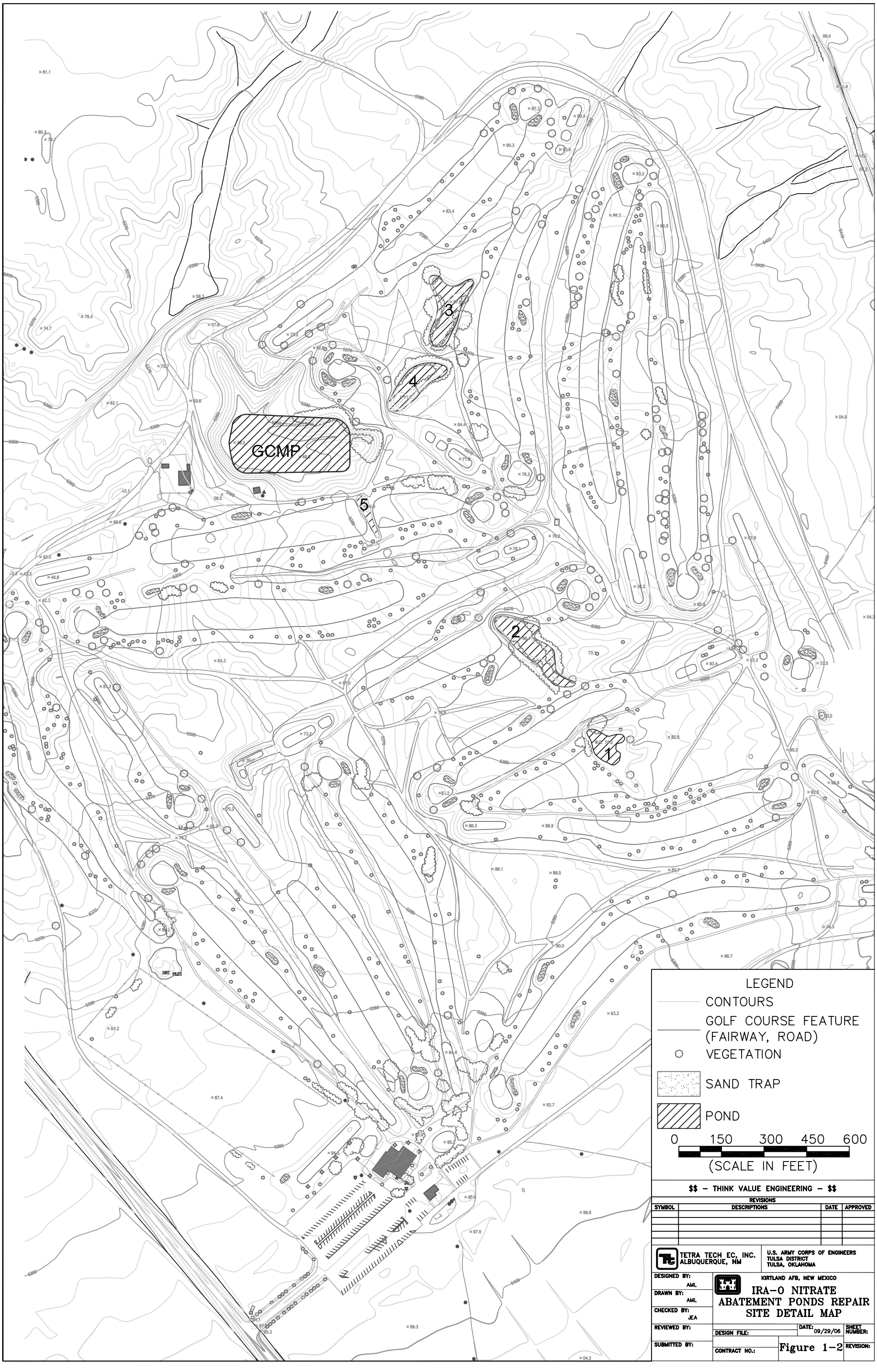
U.S. ARMY CORPS OF ENGINEERS TULSA DISTRICT TULSA, OKLAHOMA

KIRTLAND AFB, NEW MEXICO

IRA-0 NITRATE ABATEMENT PONDS REPAIR LOCATION MAP

DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: JEA
REVIEWED BY: REV
SUBMITTED BY: JEA
DESIGN FILE:
DATE: 09/29/06
SHEET NUMBER:
CONTRACT NO.:
Figure 1-1
REVISION:

P:\Tulsa CEC\TO 03 - Kirtland AFB\Work Plans\DWG\GC Figure 1.dwg 9/29/2006 9:10:00 AM MDT



$$ – THINK VALUE ENGINEERING – $$

REVISIONS

SYMBOL	DESCRIPTIONS	DATE	APPROVED

TETRA TECH EC, INC.
ALBUQUERQUE, NM

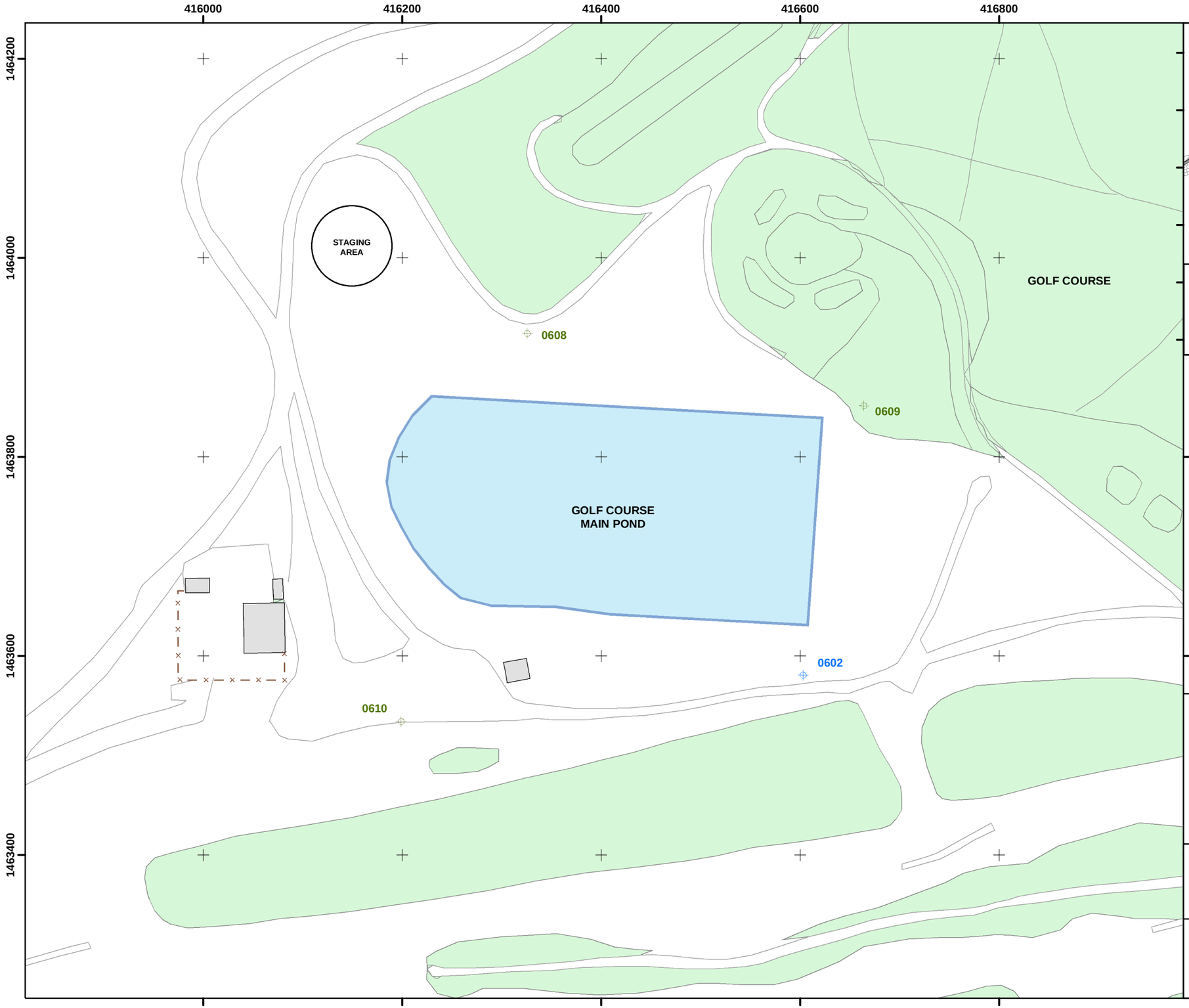
U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

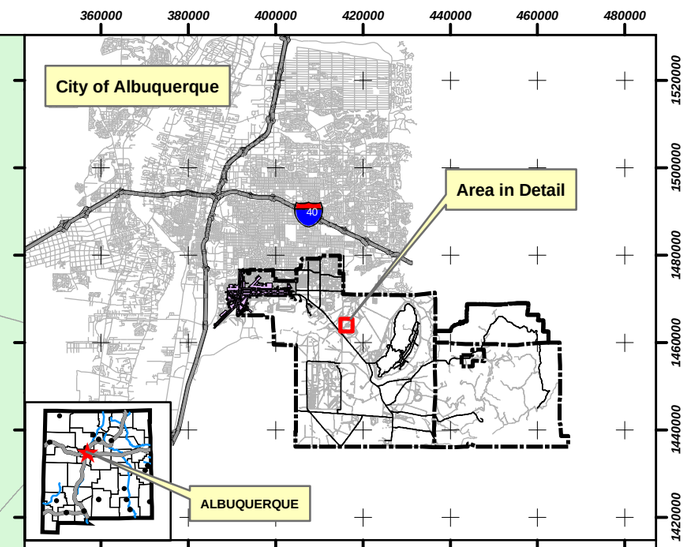
KIRTLAND AFB, NEW MEXICO

IRA–O NITRATE ABATEMENT PONDS REPAIR SITE DETAIL MAP

DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: JEA
REVIEWED BY:
SUBMITTED BY:
DATE: 09/29/06
DESIGN FILE:
CONTRACT NO.:
SHEET NUMBER:
REVISION:

Figure 1–2





LEGEND

- PERCHED MONITORING WELL
- REGIONAL MONITORING WELL
- 0602 MONITORING WELL IDENTIFICATION NUMBER
- BUILDING
- ARTERIAL ROAD
- FENCELINE
- POND BOUNDARY

NOTES:
Coordinate System: NAD 27 New Mexico State Plane, Central Zone, U.S. Foot

N
W E
S

0 50 100 200 Feet

1 inch = 100 feet

KIRTLAND AIR FORCE BASE
IRA-O NITRATE ABATEMENT PONDS REPAIR

FIGURE 1-3
GOLF COURSE MAIN POND
DETAIL MAP

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modified: 09/27/2006

2. CONSTRUCTION ACTIVITIES

2.1 Preconstruction Activities

Prior to construction activities a walk-through will be conducted to identify and inspect site and equipment access, staging areas for equipment and material (liner and rock stockpiles), potential site hazards, and emergency evacuation routes. All onsite activities will occur around the ponds and in the staging area located in the northwestern portion of the site. Removal of a few small trees along the pond banks may be required to allow access of construction equipment to the eroded areas.

Tetra Tech will schedule, coordinate, and conduct a preconstruction project kick-off meeting at Kirtland AFB's Environmental Management offices. The preconstruction meeting will be in the form of an operational readiness review to ensure that all involved parties on the base benefit by receiving a shared vision and the most efficient coordination during project execution. Along with key Tetra Tech personnel the attendees will include the Base Environmental Management, Tijeras Arroyo golf course personnel, the United States Army Corps of Engineers (USACE), and the New Mexico Environmental Department. Discussions will include plans and procedures, process and material specifications, appropriate points of contact, and schedule for field work and regulatory activities.

Base and golf course personnel will be contacted by the Site Superintendent to reduce the pond water level in the GCMP, drain the five smaller ponds, and remove any Koi prior to construction activity.

2.2 Permits and Approvals

Prior to construction, Tetra Tech will investigate all applicable permitting requirements, procure all applicable permits, and secure all notifications necessary to implement the project tasks. This will include permits required for all local, state, and federal agencies as appropriate. Local permits include Kirtland AFB and city of Albuquerque requirements, such as land disturbance, work, dig, hot work, air emissions, and facility entrance permits. Tetra Tech will acquire badges for personnel and contact the utility locating service. The application for dig permits will be submitted prior to any scheduled excavation activity. A preconstruction permit checklist is provided in Appendix A for reference.

2.3 Schedule Coordination with Golf Course and Base

Tetra Tech intends to work 6 days per week to expedite completion of the project. Tetra Tech will closely coordinate fieldwork activities with the golf course and Base Services. Work will be conducted during non-standard hours or will be shut down during regular or tournament play at the golf course per direction of the Base. The Site Superintendent will coordinate fieldwork activities with the golf course and Base Services to avoid any unnecessary inconvenience to normal golf operations.

The golf course is self-sustaining and needs to remain open and operating. During the GCMP construction activities, there will be no need for a temporary impoundment. The GCMP can be kept in operation because the repairs will be conducted near the top of the slope. It will only be necessary for base/golf course personnel to lower the water level approximately 2 to 3 feet. Should it be necessary for golf course maintenance to utilize a different water source, they have the capability to irrigate with an available potable water supply.

The pond repair activities at the golf course will take place over a period of 40 working days. Once the water level has been sufficiently lowered or drained, Tetra Tech will conduct the clearing and grubbing,

debris removal, liner inspection and repair, and replacement of the riprap prior to turning the ponds back to Grounds Maintenance.

2.4 Management Plan

The following Management Plan describes our organizational approach and key project personnel, safety and quality management, task order administration, and communications. All of the following sections address communications with the government and regulatory agencies, and strategy anticipated for achieving project tasks and practical implementation.

2.4.1 Organizational Approach and Key Personnel

Our organizational approach relies on a core group of highly experienced, key personnel who are assigned full responsibility, authority, and accountability to complete the task order. The project team includes:

- Project Manager: Pam Moss
- Construction Manager: Eric Snow
- Kirtland AFB Superintendent: Ruben Juarez
- Site Superintendent/Health and Safety Officer (HSO): Rod Reese
- Quality Control System Manager (QCSM): John McBee
- Project Engineer: Ron Versaw

Key personnel are familiar with the base customer and regulators. Figure 2-1 illustrates the project organization.

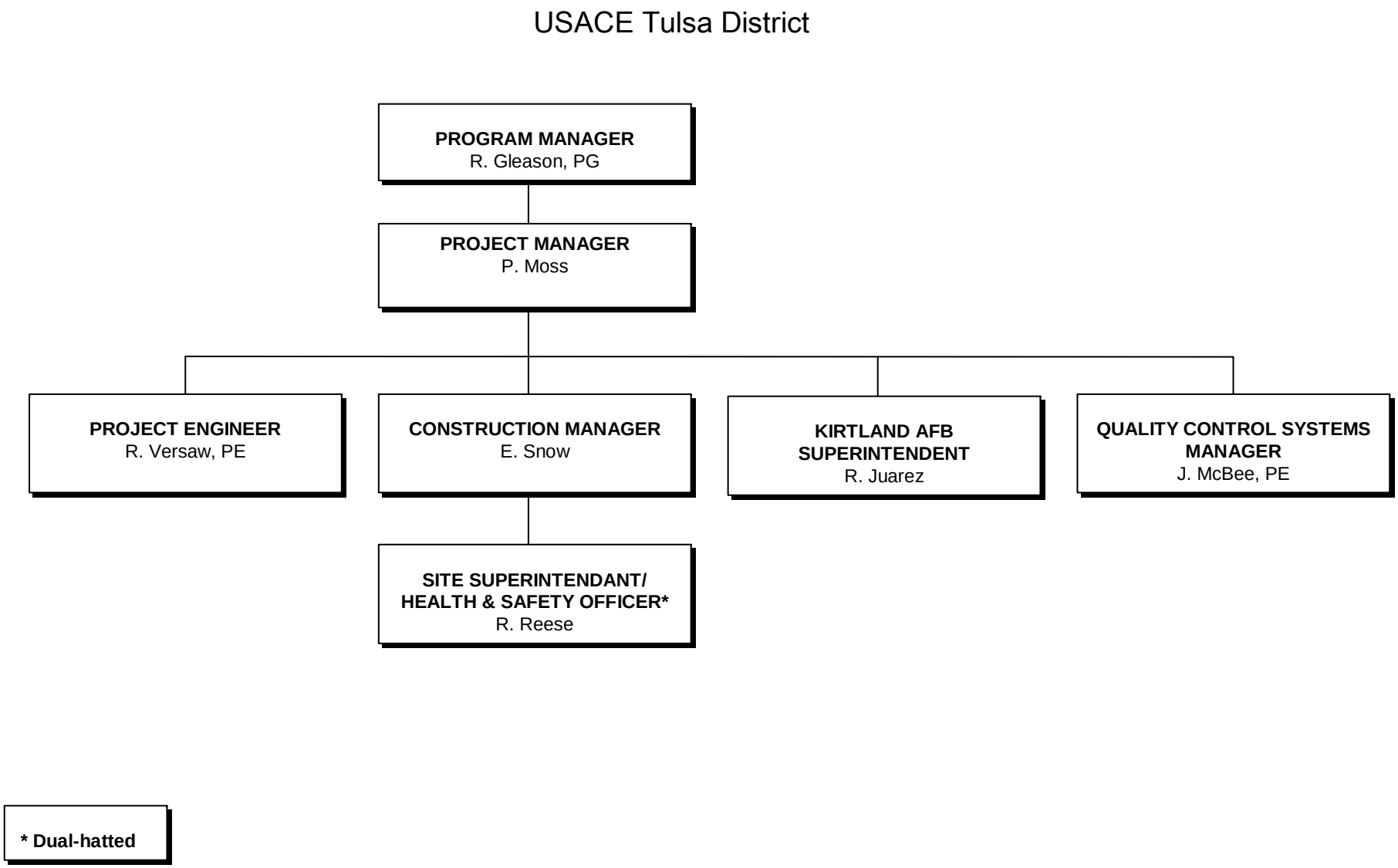
2.4.2 Subcontractors

The following Small Business (SB) and Small Disadvantaged Business (SDB) subcontractors will support the Kirtland AFB Nitrate Abatement Pond Repair project. These subcontractors enhance resources and skills to complete the work and contribute to socioeconomic goals under the Tulsa CEC.

- *Texas Environmental Plastics, Ltd.* (TEP). TEP is a SB that will provide personnel, welding equipment, quality control (QC), and 40-mil HDPE to support and augment our personnel and material resources for the project. TEP will perform all liner repair work for the GCMP and all liner installation at the five smaller ponds.

- *Chava Trucking.* Chava Trucking is a SDB that will haul wastes generated during the Nitrate Abatement Pond Repair project. They have supported Tetra Tech on several projects at Kirtland AFB (LF-001, LF-002, and LF-107) and are familiar with base and safety requirements for hauling on base roads.

Figure 2-1. Project Organization Chart



2.4.3 Safety Management

Rod Reese, Site Superintendent and HSO, will be onsite full-time during all field operations at Kirtland AFB. Mr. Reese will perform oversight of daily activities and assist the Project Manager and Construction Manager by ensuring safe work conditions and practices. He will be responsible for holding the daily safety meetings, leading safety incident investigations and reporting, leading toolbox meetings, and ensuring a safe work environment. Section 3 includes health and safety plan discussion.

2.4.4 Quality Management

John McBee will serve as the QCSM, providing QC oversight, assistance, and inspections. He will support the project team in developing and implementing the Contractor Quality Control Plan (CQCP) consistent with the requirements of the Kirtland Base-Wide Plans (USAF, 2004b). The CQCP provided in Appendix A documents the approach and procedures to be used throughout the execution of the Kirtland Nitrate Abatement Pond Repair project. QC responsibilities include:

- Oversee and verify testing to demonstrate that project quality objectives are met.
- Maintain all quality-related documentation, including input of Quality Control Reports.

The Tetra Tech Geosynthetics Installation Quality Control Manual (Appendix A) will be used to ensure that work meets or exceeds USACE and manufacturer requirements. Liner system QC elements include material approval, product handling, installation, seaming and joining, field testing, destructive seam testing, repair procedures, backfilling of the anchor trench, material contact with the geomembrane, appurtenances and mechanical attachments, acceptance, and completion.

2.4.5 Communications

Tetra Tech will create and sustain successful, cooperative working relationships throughout the project. At the onset of the project, the Project Manager and the project team will formulate a schedule of communications (daily, weekly, monthly) with USACE and the base. The Project Manager will communicate several times a week with USACE and base representatives via telephone and conduct periodic site visits. In addition, weekly status meetings or teleconferences between key USACE, Tetra Tech, and Kirtland AFB personnel will be conducted to review project status.

2.5 Clear and Grub Excess Vegetation

Base/golf course personnel will drain the water level of the GCMP to approximately 2 to 3 ft from the top of the headboard before clear and grub activities are begun. The five smaller ponds will be drained in sequence as construction proceeds, and before clearing and grubbing. Base/golf course personnel will relocate any Koi as necessary.

Clear and grub the approximately 1.85-acre GCMP to remove vegetation and small trees using a CAT 416 rubber tired backhoe and laborers with hand tools. Roots from the small trees will be carefully removed to depth in order to prevent the possibility of re-growth. Removal of larger trees will be on a case-by-case basis as recommended by Kirtland AFB.

Clear and grub the five smaller ponds (approximately 2.1 acre total). Clearing and grubbing will be performed with a CAT D6 dozer, assisted by a CAT 966 wheel loader, to remove vegetation and any small trees.

Upon approval from Kirtland AFB, an herbicide will be used to prevent vegetation from re-growing, especially near the edges of the pond liners. Debris from the clearing and grubbing effort will be loaded into dump trucks and hauled to the on-site landfill, LF-268, for disposal (Appendix D).

2.6 Re-Grade Bottom Surface and Side Slopes of Ponds

After clearing and grubbing, the CAT D6 dozer will re-grade the bottom and side slopes of the four smaller ponds (approximately 2.0 acres total) and fifth small pond located on the golf course fairway (approximately 0.1 acres). The side slopes will be graded to a slope of 3:1. The existing slopes are steeper than 3:1, so no imported material or stockpiling will be required. Excess soil will be used to build a small windrow at the toe. Any remaining excess soil will be recycled for other use or hauled to LF-268 for disposal.

The soil will be compacted to a minimum 90 percent of Standard Proctor density using compaction equipment. Field density tests will be performed to verify the compaction. It is anticipated that approximately six compaction tests will be required around the perimeter of the GCMP and one to two tests will be required at each of the five smaller ancillary ponds. More details are included in the Testing Plan found in Section 4 of the QA/QC Plan provided in Appendix A. An as-built survey of the reconstructed ponds will be performed once all work on the ponds is completed.

2.7 Liner System Repair and Replacement

Once the clearing and grubbing are completed at the GCMP and prior to beginning liner repairs, a thorough inspection of the exposed liner above the water level will be conducted to identify and locate all liner damage including pinholes. Inspection of the existing liner will only be performed on that portion of the liner that will be exposed above the water level. The areas of 40-mil HDPE liner requiring repair will be properly prepared for repairs by thoroughly cleaning the areas that will be patched, or replaced if the damage is too significant to patch.

After re-grading is completed, installation of the new 40-mil HDPE liner at the five smaller ponds will be performed with the assistance of the CAT 966 wheel loader. The liner will be anchored in a 1-ft-deep by 1-ft-wide anchor trench at the top of slope.

Installation and repairs of the 40-mil HDPE liner will be performed by TEP in accordance with industry standards and the requirements of the Tetra Tech Geosynthetics Installation Quality Control Manual provided in Attachment A. The manual will be used as a guide to conduct quality assurance (QA)/QC inspection of liner installation, repairs, testing, and documentation. Liner activities will be observed by the QCSM and will include observation of the installation, repairs, testing, and documentation.

2.8 Placement of Riprap

Rounded 3- to 4-inch (in) minus riprap will be placed once the liner installation and repairs are complete, all QA/QC testing has been performed, and the liner is accepted. Placement of riprap at the GCMP will be performed with the assistance of the CAT 416 rubber-tired backhoe above the water line on exposed areas of the liner system. At the five smaller ponds, rounded riprap will be placed with the assistance of a CAT 966 wheel loader. The small windrow will help prevent the riprap from slipping down the liner system. Laborers will complete the positioning of the rounded riprap by hand in order to prevent possible damage to the 40-mil HDPE liner system.

Tetra Tech intends to reuse the existing riprap where possible and import new riprap as necessary. Tetra Tech will not recover riprap that has settled on the GCMP bottom as damage to the existing liner could

result in a potential release of nitrate-contaminated water. In the event rounded rock is not economically available, 3- to 4-in minus fractured angular rock may be used with an 8-ounce per square yard geotextile between the rock and the 40-mil HDPE liner. The geotextile will help prevent damage to the liner. Using angular rock in place of rounded rock may provide a safer walking surface for golf ball recovery efforts.

2.9 Replace the below-Grade Fill Lines with above-Grade Fill Lines

Before the 40-mil HDPE liner is installed and tested, the existing polyvinyl chloride (PVC) fill pipe for the five smaller ponds will be exposed for at least 10 ft with the aid of the CAT 416 rubber-tired backhoe and laborers with shovels. The pipe will be cut and bends installed to raise the fill pipe such that filling will occur above the liner anchor trench. The pipe will be installed such that the outfall extends beyond the liner anchor trench, and minimized to prevent potential hazards to golfers and maintenance equipment. The anticipated flow is low enough that slope protection beneath the outfall is not necessary. Final connection of the PVC fill pipe will occur after the liner is installed and the anchor trenches are backfilled. Base/golf course personnel will verify that the relocated fill pipes function as designed.

2.10 Runon Control and Pollution Prevention

Runon will be controlled by constructing permanent berms as necessary around the perimeter of the ponds to prevent rain runoff from the surrounding golf course fairways from draining into the ponds. Construct the berms to a minimum of 1 ft above surrounding grade. The berms may be field adjusted higher if necessary to ensure that no surface water enters the ponds.

The project Stormwater Pollution Prevention Plan is provided in Appendix B.

2.11 Site Restoration

The disturbed areas at the golf course pond sites will be restored by transitioning from the disturbed areas to the undisturbed areas using grading to minimize abrupt slope changes and erosion. Rounded transitions will be provided at the top and bottom of the banks and at other breaks in grade. The final grade contours will be carried to existing contours, ensuring a smooth transition. All trash and construction-related material will be removed or disposed. Disturbed areas will be reseeded using a hydro seed grass mixture.

2.12 Waste Management

There are no hazardous wastes anticipated in this project. The project Waste Management Plan is contained in Appendix D.

2.13 Operation and Maintenance Plan Development

A Draft and Final comprehensive O&M Plan will be developed for the GCMP and the five smaller nitrate abatement ponds. The O&M Plan will address the long-term maintenance of the GCMP and the five ancillary ponds to allow for maintaining the ponds consistent with the condition at completion of this task order. Lessons learned from other site plans will be incorporated to ensure low risk to USACE and the base.

Implementation of the O&M Plan will be in accordance with the final O&M Plan for the GCMP and the five smaller nitrate abatement ponds. USACE Tulsa District (through base approval) may exercise this option at any time for a period of 1 year. For the first year of O&M, activities will include monthly inspections of all nitrate abatement ponds and inspections after major rain events, minor vegetation removal, possible riprap replacement, and possible liner repair.

3. SAFETY AND HEALTH REQUIREMENTS

This section provides the site-specific safety and health requirements for the planned construction services at the GCMP and five ancillary nitrate abatement ponds. All field activities will be conducted in accordance with the Kirtland AFB Base-Wide Health and Safety Plan (SHSP) (USAF, 2004b) and the site-specific requirements described in this Work Plan. The project SHSP is contained in Appendix C.

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4. REPORTING

4.1 Meeting and Communications

For the preconstruction kick-off meeting and all subsequent meetings and correspondence, Tetra Tech will prepare and maintain file records of all communications throughout the entire project duration. The records will identify all personnel involved in the communications, the dates and times of the communications, subjects of the communications, and conclusions, directions received, or actions taken as a result of the communications.

4.2 Submittals

The QCSM will maintain a record of all submittals with the submittal register in Appendix E, and will provide electronic PDF copies of the final implementation or closure report on compact discs. Microsoft Office software will be used for text and tables, and AutoCAD for drawings.

4.3 Property Management

The Site Superintendent will acquire and manage property in accordance with Tetra Tech's approved Purchasing System and Property Management Plan. Based on the limited scope and abbreviated duration of the project, no permanently installed equipment is anticipated. If any such items are purchased, they will be bar-coded and inventoried, and Tetra Tech will provide a final inventory of at project completion.

4.4 Reports and Data Submittals

The project team will routinely be in compliance with status, accountability reporting, and data submittal requirements. The Project Manager will supervise preparation and submission of all required reports and data submittals including:

- Status Reports and Pay Estimates: develop and submit a schedule of prices by task, itemized status report, and payment request once each month, which will show a work breakdown and percent complete.

- Quality Control Reports: prepare and submit of daily QC reports to the USACE Technical Manager or Quality Assurance Representative documenting and accurately describing the activities performed each day fieldwork is in progress.

- Weekly Status Reports: Project Manager will prepare and electronically submit brief weekly status reports for the completed and ongoing work elements, a planned look ahead for the following week, and any problems requiring corrective actions.

- Photographs: Site Superintendent will document the fieldwork progress and activities with digital photographs, maintain a photograph logbook, and provide the photographs in an appendix to the completion report.

- Data Validation Reports/Data Packages: If wastes are mandated to be disposed offsite, analytical data will be validated prior to off-site waste disposal. Since wastes are expected to be disposed in on-site landfill LF-268, analytical data validation/data packages will not be necessary.

4.5 Completion Report

A Completion Report documenting construction activities in support of the IRA-O project will be generated once the construction activities have been completed. The *Completion Report for the Golf Course Main Pond Repair Activities and Golf Course Production Well Redevelopment at Kirtland Air Force Base* (USAF, 2004a) will be used as a template. The report will document all work activities performed at the GCMP and five ancillary nitrate abatement ponds, in addition to site location map and drawings, survey results, and site photos. The completion report will be submitted in draft and final versions to USACE Tulsa and Kirtland AFB for review.

5. REFERENCES

USACE, 2003. *Addendum Letter Work Plan to the Long-Term Groundwater Monitoring Plan for the Golf Course Main Pond (WP-026) Repair Activities.* Kirtland Air Force Base, New Mexico.

USAF, 2004a. *Completion Report for the Golf Course Main Pond Repair Activities and Golf Course Production Well Redevelopment.* Kirtland Air Force Base, New Mexico.

USAF, 2004b. *Final Base-Wide Plans for the Installation Restoration Program*. Kirtland Air Force Base, New Mexico.

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APPENDIX A

Contractor Quality Assurance and Quality Control Plan

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

CONTRACTOR QUALITY ASSURANCE AND QUALITY CONTROL PLAN FOR INTERIM REMEDIAL ACTION–OPERATION NITRATE ABATEMENT PONDS (GOLF COURSE) REPAIR AT WP-026 AND ST-105 KIRTLAND AIR FORCE BASE, NEW MEXICO

September 2006

Prepared For
U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

Project No. MHMV 06-7037
Task Order 0003

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
CM	Construction Manager
CMI	Corrective Measures Implementation
CQC	Construction Quality Control
CQCP	Contractor Quality Control Plan
DCN	Design Change Notice
DFW	definable feature of work
FADL	Field Activity Daily Log
GCMP	Golf Course Main Pond
HDPE	high-density polyethylene
NCR	Nonconformance Report
NMED	New Mexico Environment Department
P.E.	Professional Engineer
P.G.	Professional Geologist
PM	Project Manager
QA	quality assurance
QAM	Quality Assurance Manager
QC	quality control
QCR	Quality Control Report
QCSM	Quality Control System Manager
SHSP	Site Health and Safety Plan
Tetra Tech	Tetra Tech EC, Inc.
USACE	United States Army Corps of Engineers
USAF	United States Air Force

1. INTRODUCTION TO CONSULTANT QUALITY CONTROL PLAN

This plan combines the U.S. Army Corps of Engineers (USACE) Construction Quality Assurance Plan with the Tetra Tech Construction Quality Control system requirements to form a set of common requirements commensurate with the scope and nature of services planned under Project No. MHMV 06-7037, Task Order 0003. The Contractor Quality Assurance and Quality Control Plan (CQCP) establish the procedures and methods to be implemented for the Interim Remedial Action-Operation (IRA-O) Nitrate Abatement Ponds (Golf Course) Repair at WP-026 and ST-105, Kirtland Air Force Base (AFB), New Mexico.

1.1 Purpose

The objective of the CQCP is the successful execution of the IRA-O Nitrate Abatement Ponds Repair project at WP-026 and ST-105. The CQCP provides an effective quality assurance (QA) and quality control (QC) system to ensure the quality of all work performed by Tetra Tech and subcontractor personnel and describes the specific organization, personnel, procedures, controls, instructions, tests, records, submittals, and forms to be used to ensure that all work products comply with the contract requirements and client specifications.

1.2 Scope

This CQCP is applicable to all construction operations and related project activities and will be available in the project field office. All work activities will be conducted in accordance with the IRA-O Nitrate Abatement Ponds Repair at WP-026 and ST-105 Work Plan (Work Plan) and applicable sections of the Base-Wide Quality Assurance Project Plan (United States Air Force [USAF], 2004). The CQCP will be implemented for the following definable features of work (DFWs) identified for repair of the Golf Course Main Pond (GCMP):

- Preconstruction Activities. Includes completing the preconstruction permit checklist, meetings with key project personnel, and site walk-arounds. The pond water level will be lowered by base/golf course personnel to facilitate repair activities. Koi fish will be relocated, as needed.
- Mobilization. The staging and loading area for liner and rock material will be established at the golf course maintenance building laydown area, in the northwestern portion of the site.
- Construct 1-ft-high berms around the GCMP as required to protect the construction area from stormwater runon from the surrounding areas.
- Clear and grub excess vegetation.
- Repair the 40-mil high-density polyethylene (HDPE) liner.
- Replace riprap over exposed portions of the liner system.

Construction activities at the group of five smaller ponds will be according to the following DFWs:

- Construct 1-ft-high berms if required to protect the construction areas from stormwater runon. Silt fencing may be installed as necessary to prevent runoff from temporarily disturbed areas.

- Clear and grub excess vegetation.
- Re-grade bottom surface and side slopes of ponds.
- Install new 40-mil HDPE liner in the four smaller ponds.
- Replace the liner system in the fifth pond with 40-mil HDPE.
- Place protective riprap along the pond surfaces and sidewalls. Backfill and compact anchor trenches and top with rounded riprap.
- Replace the below-grade fill lines in all five ponds with above-grade fill lines in order to remove the fill pipe liner penetrations.
- Demobilization.

A detailed description of these construction activities is provided in Section 2 of the Work Plan.

2. ORGANIZATION AND RESPONSIBILITIES

This section describes the organization and authority for project personnel who will be performing construction operations, both onsite and offsite, including subcontractors, fabricators, suppliers, and purchasing agents. The organizational structure, functional responsibilities, personnel qualifications, levels of authority, and lines of communication are established within the organization to ensure that high-quality work is documented. The project organization chart showing the reporting lines for each individual is provided as Figure 2-1 in the Work Plan.

All personnel assigned to this project will have the appropriate qualifications and experience. The responsibilities and authorities of the key project personnel are described in the following paragraphs and in Section 2.4 of the Work Plan. Resumes of key personnel are included in Attachment 1.

2.1 Project Manager

The Project Manager (PM), Ms. Pam Moss, is responsible for the direction, execution, and successful completion of project tasks, as well as for the execution of the tasks within overall project goals. Ms. Moss has responsibility for and the authority to perform the following tasks affecting activities related to the project:

- Prepare and approve all proposed task orders
- Direct the Construction Manager (CM) to undertake and accomplish required construction

2.2 Construction Manager

Mr. Eric Snow is the project CM and reports to the PM. His primary responsibility is the implementation of all field activities. The duties of the CM as they apply to the project include the following:

- Coordinate work activities of subcontractors and Tetra Tech personnel according to the administrative and technical requirements of the project, including corporate procedures and applicable professional standards and construction activities
- Monitor and report the progress of work and manage project deliverables to ensure completion on time and under budget
- Adhere to the quality requirements of the contract, work specifications, and the CQCP
- Manage work activities in a safe manner in accordance with the Site Health and Safety Plan (SHSP), Appendix C of the Work Plan
- Serve as the primary contact between Kirtland AFB, USACE, and Tetra Tech for actions and information related to the work
- Communicate and interface with the Tetra Tech Quality Control System Manager (QCSM)
- Establish a field base for operations and mobilizing subcontractors and Tetra Tech personnel
- Procure equipment for work crews and health and safety personnel

- Coordinate all personnel involved in task activities, including obtaining support services

2.3 Project Engineer

Mr. Ron Versaw, Professional Engineer (P.E.), is the Project Engineer and reports to the PM. His primary responsibility is assuring that field activities including field engineering survey control, inspection and testing, and engineering are implemented as required by the project plans, designs, and specifications. He will notify the CM of any design changes or Nonconformance Reports (NCRs). The duties of the Project Engineer as they apply to the project include the following:

- Serve as the point of contact for all field engineering inquiries regarding engineering and construction activities
- Develop and approve design changes and variances
- Prepare engineering documents in accordance with the specifications and drawings including sealing engineering documents as required by New Mexico statutes
- Provide the PM reports on the engineering construction and fiscal progress

2.4 Site Superintendent

The Site Superintendent, Mr. Rod Reese, reports to the CM and is responsible for coordinating, directing, implementing, and supervising site construction activities. Support to the Site Superintendent will be provided by the Kirtland AFB Superintendent, Mr. Ruben Juarez. Specific duties of the Site Superintendent include the following:

- Acquire necessary permits, licenses, and rights-of-way.
- Implement construction activities in accordance with the Work Plan.
- Direct craft personnel.
- Administer site access.
- Maintain work site, vehicles, and equipment.
- Coordinate and maintain logistics of all components of onsite tasks, including all personnel and equipment.
- Prepare daily production and weekly status reports along with a monthly summary report and estimate future scheduling needs.
- Coordinate, prepare, and complete all required field reports.

2.5 Construction Quality Assurance Personnel

The Quality Assurance Manager (QAM), Mr. Ray Macias of USACE-Albuquerque District, or his designated representative (USACE QA), is responsible for the overall management of project QA and coordinates with the Technical Manager, Mr. Jim Martell, P.G., of USACE-Tulsa District. The QA activities are completely independent of the QC activities. The QAM may perform additional testing and inspection other than the testing required in this CQCP to verify quality of data and analysis generated by QC personnel.

The duties of the QAM as they apply to this plan include, but may not be limited to, the following:

- Perform QA qualitative reviews of project QC activity
- Perform QA inspections designed to ensure that the overall QC program is functioning in accordance with the CQCP
- Check the use of QC measures appropriate to the work or DFW
- Perform audits, inspections of facilities, equipment, systems, record keeping, testing, equipment calibration procedures, reporting requirements, compliance with QC document control procedures, and other QC measures
- Review supporting calculations, drawings, specifications, variance reports, Design Change Notices (DCNs), and NCRs to assure that proper QC procedures are followed
- Review all testing results, data, and certification report submittals
- Conduct independent testing of QC tests if discrepancies are suspected to determine program effectiveness
- Document frequency and accuracy of testing achieved
- Interview project personnel
- Review working files, QC forms and checklists, punchlists, and document storage
- Review and approve final QA/QC reports

2.6 Quality Control System Manager

The QCSM, Mr. John McBee, P.E., is responsible for managing the daily QC construction activities and reports. The QCSM has the authority to act on behalf of the PM to stop work on site-related issues affecting the quality of the work performed.

The duties of the QCSM as they apply to this project include the following:

- Provide and maintain an effective CQC system for all construction activities.
- Monitor QC activities to ensure conformance with authorized policies, procedures, contract specifications, required standards, sound practices, and methods of quality construction.

- Maintain sufficient staff to perform all QC activities to ensure QC for all work phases, work shifts, and work crews.
- Contribute to the Field Activity Daily Log (FADL) prepared by the Site Superintendent
- Ensure that the Quality Control Reports (QCRs) in Attachment 5 are properly prepared
- Conduct required tests and inspections and documenting results
- Conduct required QC meetings, including the preconstruction meeting, site survey visit, and other scheduled meetings
- Perform inspections and conducting or supervising testing activities
- Coordinate and maintain submittal schedule, photograph log sheet, request for information, and NCR log
- Review and maintain records of approved submittals, DCNs for construction activities, and variance reports
- Inspect material delivery handling and storage in accordance with product specifications
- Interrupt and correct work that is not in compliance with the contract with approval by the PM
- Inspect the work performed for compliance with the Work Plan and specifications

2.7 Subcontractors and Vendors

Qualified subcontractors may be selected to provide various construction services for this project. The subcontractor is required to provide labor, material, and equipment necessary to conduct construction activities as directed by the procurement documents. Subcontractors and vendors will be required to conform to Tetra Tech's CQCP and the requirements of all approved procedures, specifications, and contract provisions.

The subcontractor's QC inspectors are responsible for field inspection of their construction and operating activities. Tetra Tech personnel will monitor, over see, and make onsite observations and inspections of work in progress to determine whether the subcontractor's work is proceeding in accordance with the CQCP.

Subcontractor personnel are responsible for maintaining a daily log of the project activities they perform and for providing information needed to complete the QCRs on a daily basis. All inspection records, including inspection reports, deficiency reports, and re-inspections of corrective actions, will be documented.

3. SUBMITTALS

This section describes the review and approval process of submittals. The QCSM will institute and maintain a Submittal Register form (Attachment 2) to track submittals from issue to approval. A list of required submittals will be developed at the initiation of the project activities and will be revised as required. Submittals will be scheduled, reviewed, certified, and managed in accordance with procedures defined in this section.

Required submittals may consist of the following types:

***Data*—**Submittals that provide calculations, descriptions, or documentation of the work.

***Drawing*—**Submittals that graphically show the relationship of various components of the work: schematic diagrams of systems and details of fabrication layouts of particular elements, connections, and other relational aspects of the work.

***Instruction*—**Preprinted material that describes the installation of a product, system, or material, including special notices and material safety data sheets concerning impedances, hazards, and safety precautions.

***Schedule*—**Tabular lists showing the location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

***Statement*—**A required document that confirms the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.

***Report*—**Reports of inspections or tests, each property identified, and an interpretation of results that includes a description of test methods and all results.

***Certificate*—**Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system, or material, attesting that the product, system, or material meets specified requirements. The statement must be dated after the award of this contract, must state the contractor's name and address, must name the project and location, and must list the specific requirements that are being certified.

***Sample*—**Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

***Record*—**Documentation to record compliance with technical or administrative requirements.

***Plans*—**Work Plans, Contractor QC Plans that document work practices to be performed during the construction activities.

3.1 Submittal Requirements

Submittal requirements shall be in accordance with Work Plan. The following requirements apply to all submittals:

- Units of weights and measures will match those used in product specifications.

- Each submittal will be complete and in sufficient detail to allow determination of contract compliance.
- The QCSM will check submittal items prior to submittal routing for approval.
- Proposed deviation from the contract requirements will be clearly identified.

3.2 Review of Submittals

Submittals will be reviewed to ensure completeness, accuracy, and contract compliance. All items will be checked by the QCSM and approved by the PM or designated representatives. Any submittals requiring modifications or changes will be returned to the originating organization for correction and then resubmitted for review by the QCSM and approval by the PM, or designee, prior to acceptance. Approval of the submittal by the PM will be indicated by stamping, signing or initialing, and dating the submittal form.

3.3 Submittal Process

The QCSM will provide all submittals to the QAM and project personnel as determined by the distribution schedule established during the client kick-off meeting. Each submittal will have a project document control number. All possible attempts will be made to schedule submittals to allow for approval time noted in the contract and project scope of work. However, certain submittals may require accelerated processing to maintain the construction schedule. Each transmittal will be identified with the following:

- Name and address of the submitting organization
- Date of submittal
- Description of item being submitted, including reference to specification section
- Approval of submitting organization indicating conformance to the requirements

The QCSM will update the submittal register regularly.

3.4 Revised Submittals

Revised submittals will be logged, reviewed, and processed in a manner identical with the initial submittal. Long-term disposition of submittals and documents will be at the Central New Mexico Community College, Montoya Campus, with additional copies maintained in the USACE repository and Kirtland AFB Environmental Management office.

4. TESTING

The QCSM shall ensure the performance of all tests specified or required by the product specifications and Work Plan to verify control measures are adequate to provide a product conforming to contract specifications.

The type, number, and frequency of required tests are specified below. Requirements identified in manufacture specifications shall take precedence over this plan. The Site Superintendent is responsible for conducting or coordinating the required tests with the QCSM. These tests include both operational and acceptance testing as appropriate. For all testing activities, the QCSM shall verify and document that:

- Testing procedures comply with contract requirements and the Work Plan.
- Facilities and testing equipment are available and comply with testing standards.
- Instrument calibration data checks against certified standards and certification are current.
- Recording forms and the test identification control number system have been prepared.

The QCSM is responsible for maintaining the testing plan.

4.1 Documentation

All test results, both passing and failing, will be recorded on the FADL for the day the results are obtained. Specification reference, location where tests were taken, and the sequential control number identifying the test will be given. The actual test reports may be submitted later to the QAM. In the event tests are performed at an offsite facility, an information copy of tests results will be provided directly to the PM or designee.

4.2 Laboratory Services

Limited independent testing laboratories are anticipated for soils and rock testing. Testing will meet USACE standards. In the event additional offsite laboratory services are needed, the laboratory will be selected and qualified in accordance with recognized industry and applicable project requirements.

4.3 Test Plan

The Test Plan will include the following:

- Compaction Testing: The soil will be compacted to a minimum 90 percent of Standard Proctor (ASTM D-698) density using compaction equipment. A minimum of one Standard Proctor density test will be performed in each pond. If more than one material type is present, then an additional Standard Proctor test(s) may be required. A minimum of two field density tests (ASTM D-2922) will be taken at each pond to verify that the 90% compaction criteria has been achieved. Moisture content (ASTM D-3017), and sand cone (ASTM D-1556) tests will be performed at the discretion of the CM.
- Geosynthetic Liner Repair Testing: The liner repairs will be tested in accordance with the Tetra Tech EC, Inc. Geosynthetics Installation Quality Control Manual provided in Attachment 4.

- Geosynthetic Installation Testing: The new liners will be tested in accordance with the Tetra Tech EC, Inc. Geosynthetics Installation Quality Control Manual provided in Attachment 4.

5. CONSTRUCTION INSPECTION PLAN

The CQCP is the means by which Tetra Tech ensures that all construction, including that of subcontractors and suppliers, complies with the requirements of the contract. The DFWs establish the measures required to verify both the quality of work performed and compliance with specified requirements including inspecting materials and workmanship before, during, and after each DFW. The DFWs for this project are identified in Section 1.

The controls defined shall be adequately covered in a coordination and mutual understanding meeting. The meeting will address all construction operations and proposed construction sequence along with the CQCP.

Inspection requirements specific to this project are discussed below.

5.1 Project Meetings

Conducting periodic project meetings is the responsibility of Tetra Tech. The following sections provide examples of the types of project meetings that may be held.

5.1.1 Coordination and Mutual Understanding Meeting

Prior to start of site work, the CM shall conduct a meeting with the QAM, or designated representative, to discuss the QC program required by this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used, administration of onsite and offsite work, and coordination among contractor management, production personnel, the QCSM and QAM, and the QA USACE or designated representative. At a minimum, the contractor's personnel required to attend shall include the CM, Site Superintendent, and QCSM. Minutes of the meeting shall be prepared by the QCSM. This meeting may be held in conjunction with other meetings (i.e., preconstruction meeting).

5.1.2 Preconstruction QA/QC Meeting

A meeting will be held to resolve any uncertainties with scope of work, design, and Work Plan before construction is started. Representatives from Kirtland AFB, Project Engineer, CM, QA and QC personnel, and the Site Superintendent or designee should all be present. The topics of this meeting include but are not limited to:

- Provide each organization with relevant documents and supporting information
- Familiarize each organization with the CQCP and its role relative to the design criteria, plans, and specifications
- Determine any changes to the CQCP that are needed to ensure that the facility will be constructed to meet the specified design
- Review the responsibilities of each organization
- Review lines of authority and communication for each organization
- Discuss the established procedures or protocol for observations and tests
- Discuss the established procedures or protocol for handling construction deficiencies, repairs, and retesting

- Review methods for documenting and reporting inspection data
- Review methods for distributing and storing documents and reports
- Review work area security and safety protocol
- Conduct a site walk-around to review construction material and inspection equipment storage locations
- Design or specification changes

QC personnel will document the meeting, and minutes will be transmitted to all parties.

5.1.3 Daily Progress Meeting

A progress meeting will be held at the work area. At a minimum, the Site Superintendent, or designee, and QC personnel will conduct the meeting. The purpose of the meeting is to:

- Review the previous day's activities and accomplishments
- Review the work location and activities for the day
- Identify the contractor's personnel and equipment assignments for the day
- Discuss any potential construction problems

This meeting will be documented by one of the QC personnel and recorded in the FADL (Attachment 5)

5.1.4 Weekly Progress Meeting

A weekly progress meeting will be held at the field offices. The purpose of the meeting is to:

- Review the previous week's activities and accomplishments
- Review the upcoming activities for the week
- Coordinate project submittals
- Review the project quality and health and safety program
- Review the proposed project changes for their effect on construction, completion date, and other aspects of the project
- Discuss any potential construction problems

This meeting will be documented by one of the QC personnel and submitted electronically to all project participants within 5 working days of the meeting.

5.1.5 Monthly Progress Meeting

A monthly progress meeting will be held at Kirtland AFB in conjunction with the monthly status review meetings. The purpose of the meeting is to:

- Review variance reports and DCNs (Attachment 6)
- Review project status
- Review problem identification and deficiency notices and any corrective actions

Monthly meetings are documented in accordance with Section 6.2, *Conference Notes and Confirmation Notes*.

5.2 Permits

A preconstruction permit checklist must be completed with assistance from the Site Superintendent. The checklist is provided in Attachment 3.

5.3 Geosynthetic Liner Inspections

The QCSM will conduct a detailed inspection of the geosynthetic liner repairs and installation in accordance with the Tetra Tech EC, Inc. Geosynthetics Installation Quality Control Manual provided in Attachment 4.

5.4 Completion Inspection

Completion inspections will be performed as summarized in this section.

5.4.1 Construction Quality Control Completion Inspections

The QCSM or designated Tetra Tech QC inspection personnel will conduct a detailed inspection prior to the pre-final inspection, when all of the work or an increment of work is deemed to be substantially complete. The CM, the Kirtland AFB Project Manager, the QAM, and the New Mexico Environment Department (NMED) may also participate and will be notified in advance of the inspection date. The work will be inspected for conformance to plans, specifications, quality, workmanship, and completeness. The QCSM will prepare an itemized list of work not properly completed, inferior workmanship, or work that does not conform to plans and specifications. The list will also include outstanding administrative items, such as record (as-built) drawings, operations and maintenance manuals, and spare parts. The list will be included in the QC documentation, which will be submitted to the CM or designee and the QAM and Kirtland AFB Project Manager within 5 working days following the inspection and will specify an estimated date for correction of each deficiency. The completion inspection will be documented on the Completion Inspection Checklist (Attachment 5) and attached to the FADL (Attachment 5).

5.4.2 Pre-Final Inspection

The QCSM or designated Tetra Tech QC inspection personnel will conduct the pre-final inspection; the Kirtland AFB Project Manager, the QAM, NMED, Tetra Tech QC inspection personnel, the CM, or other primary management representative, as applicable, will attend. The CM or designee will schedule the pre-final inspection in response to notification from the QCSM prior to the planned inspection date. The QCSM is required to verify at this time that all specific items previously identified on Rework Items List

(Attachment 5) as being unacceptable, along with all remaining project work, will be complete and acceptable by the date scheduled for the pre-final inspection. At this inspection, the QCSM or designee will develop a specific list of incomplete and/or unacceptable work performed under the contract and will provide this list to the CM.

5.4.3 Final Acceptance Inspection

The CM will schedule the final acceptance inspection based on notification from the QCSM of readiness. The inspection will include the QC inspection personnel, the QCSM, or other primary management personnel, the CM, and the Kirtland AFB Project Manager or the QAM. Notification will be provided by the QCSM to the CM prior to the planned final acceptance inspection date and must include verification that all specific items previously identified as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.

5.5 Inspection Documentation

The QCSM is responsible for maintaining the inspection records. Inspection records will be legible and clearly provide all necessary information to verify that the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by the CM. All inspection records will be made available to the Kirtland AFB Project Manager.

At the conclusion of the project, the QAM may provide NMED with a summary report addressing project QC.

6. DOCUMENTATION

Preparation, review, approval, and issuance of documents affecting quality will be controlled to the extent necessary to determine that the documents meet specified requirements. Project documents to be controlled include the following:

- Meeting Minutes, Conference Notes, and Confirmation Notes
- Submittal Register
- FADLs with QCRs and Monthly Summary Report
- Survey Logs
- Testing Plan and Log
- NCRs/Problem Identification List
- Rework Items List
- Evaluation and Acceptance Report
- DCNs
- Variance Reports
- Pre-Final and Final Acceptance Inspection
- Project Plans
- Record Drawings

6.1 Contractor Quality Control Report

The QCSM is responsible for maintaining current records of QC operation, activities, and tests performed, including the work of subcontractors and suppliers. The records will include factual evidence that required QC activities and tests were performed. The FADL will be completed to document construction activities covered by the CQCP and will include the following:

- Contractor/subcontractor(s) and their area of responsibility
- Trades working on the project that day and number of personnel
- Operating equipment, with hours worked, idle, or down for repair
- Work performed that day, giving location, description, weather conditions, and by whom work was done
- Any delays encountered

- Test and/or control activities performed with results and references to specifications/plan requirements, including deficiencies along with corrective action
- Material received, with statement as to its acceptability and storage
- Submittals reviewed, with contract reference, by whom, and action taken
- Offsite surveillance activities, including actions taken
- Job safety evaluations stating what was checked, results, and instructions or corrective actions
- A list of instructions given/received and conflicts in plans and/or specifications
- Contractor's verification statement
- Site visitors/purpose, deviations from plans, difficulties, and resolution

The records will indicate a description of both conforming and nonconforming features covered with a statement that equipment and materials incorporated in the work and workmanship comply with the contract. A copy of this report, if requested, will be furnished to the Kirtland AFB Project Manager and/or the QAM on the first workday following the date covered by the report—reports need not be submitted for days during which no work is performed. At a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no-work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work will summarize work for that day only. Reports will be signed and dated by the QCSM and other appropriate personnel, including subcontractors responsible for completion of activities. The report will include copies of test reports and copies of reports prepared by all subordinate QC personnel.

6.2 Conference Notes and Confirmation Notes

In addition to other required documentation, the QCSM is responsible for taking notes and preparing the reports of all conferences. Conference notes will be typed and the original report furnished to the Kirtland AFB Project Manager within 7 days after the date of the conference for concurrent and subsequent distribution to all attendees. At a minimum, this report will include the following:

- Date and place the conference was held
- List of attendees, including name and organization
- Comments made during the conference and decisions affecting criteria changes
- Conference notes that augment the written comments

The CM, or his designee, is also responsible for providing a record of all discussions, verbal directions, telephone conversations, etc. in which Tetra Tech personnel or their representatives participate on matters relating to this contract and work. These records, entitled *Confirmation Notices*, will be numbered sequentially and will fully identify participating personnel, subject discussed, and any conclusions reached. The CM, or his designee, will forward a reproducible copy of the confirmation notices to the Kirtland AFB Project Manager, or designee, and the QAM within 7 workdays.

6.3 Final Documentation

At the conclusion of the project, Tetra Tech will provide the QAM with any requirements for long-term maintenance or operation of the site and any turnover requirements.

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7. NONCONFORMANCES

The QCSM, or designated Tetra Tech QC inspection personnel, documents any work or materials not conforming to product specifications or project/contract requirements on an NCR (Attachment 6). The NCR will detail the nonconforming condition, the recommended corrective action(s), and the disposition of the corrective action(s). Qualified representatives from engineering, QA, and construction will review the NCR and either accept or reject the recommended corrective action or disposition. The NCR will remain open until the nonconforming condition has been satisfactorily resolved and verified by the QC inspection staff, the QCSM, and a representative from engineering.

7.1 Identification of Nonconforming Items

Items identified as nonconforming will be documented on an NCR that will include the following information:

- Description of nonconforming item or activity
- Detailed description of nonconformance
- Referenced criteria
- Recommended disposition and corrective action to prevent recurrence, as applicable
- Affected organization
- Deficient conditions have been divided into three categories:
  - In-process deficiencies
  - Installed deficiencies
  - Conditions that require Stop Work Order

7.1.1 In-Process Deficiencies

In-process deficiencies are those conditions discovered during the course of QC inspections that are intended to be corrected or brought into conformance with requirements. The QCSM will notify the Project Engineer and advise the Site Superintendent of the problem or deficiency. Items not solved or corrected immediately will be considered in-process deficiencies and will be noted briefly on the FADL, detailed on a NCR (Attachment 6), and added to the Rework Items List (Attachment 5). Items on the punch list that cannot be corrected will be considered installed deficiencies.

7.1.2 Installed Deficiencies

Installed deficiencies are those conditions discovered during the course of QA and/or QC inspection of completed work that do not meet established acceptance criteria or requirements, and are not intended to or cannot be brought into conformance. These conditions will be noted on a Rework Items List (Attachment 5) in addition to a NCR (Attachment 6) for evaluation and disposition. The QCSM will issue the NCR summarizing discrepancies within 24 hours of discovery.

7.1.3 Condition Requiring Stop Work

If corrective actions are insufficient, resolution cannot be reached, or results of prior work are indeterminate, work may be stopped. An immediate Stop Work Order (Attachment 6) can be issued by anyone for health and safety issues. The CM, the QCSM or the QAM can issue a Stop Work Order in writing to the Site Superintendent, who will direct construction activities to stop. If there is a disagreement between the QCSM and the Site Superintendent, the difference will be brought to the attention of the CM until resolution is achieved.

The conditions of the Stop Work Order will be noted in the FADL and described in detail on a NCR (Attachment 6) and the Rework Items List to allow evaluation of the problem(s) and proper corrective action(s). Work will not continue until the CM has resolved the Stop Work Order.

7.2 Nonconforming Items

The nonconforming items will be controlled to prevent inadvertent use of material or workmanship quality. All items noted as nonconforming will be clearly identified and segregated from acceptable items when practical.

7.3 Disposition

The disposition of NCRs will include the necessary actions required to bring the nonconforming condition to an acceptable condition and may include reworking, replacing, retesting, or re-inspecting. Implementation of the disposition may be done in accordance with the original procedural requirements, a specific instruction, or an approved field change request.

7.3.1 Variance Reports and Design Change Notices

The Site Superintendent or the Project Engineer initiates a copy of a Variance Report is included in Attachment 6. A Variance Report will be used for changes to the client-approved Work Plan. The QCSM will qualify a change to the “as-designed” or “as-specified” condition.

For changes to the project design, the Project Engineer will respond by issuing and appropriately executing a DCN for approval by the CM and the QAM. The DCN is provided in Attachment 6.

The Project Engineer has the responsibility for identifying and providing input data relative to “record” conditions. “Record drawings” are drawings that reflect the as-installed conditions, and consist of the latest revision of the design drawing plus attached copies of approved changes and variances.

7.4 Corrective Actions

The QCSM must immediately identify the need to take corrective action if a nonconforming condition is detected. In addition to resolving identified nonconforming conditions, corrective action records will also address the initial cause of adverse conditions and establish methods and controls to prevent recurrence of the same or similar types of nonconformance. The QCSM will monitor the corrective actions to verify that they were properly implemented and accepted and that the original NCR was closed.

8. QUALITY MANAGEMENT

In addition to the required QC field inspections, the Tetra Tech Corporate quality program requires a quality management overview of the site QC program implementation. The QCSM will perform regular internal quality control checks on the site implementation of the QC program. Deficiencies, if any, will be reported to the CM for corrective action.

Inspection will be performed and check for the following:

- Possession and use of approved procedures, standards, and project specifications
- Conformance with appropriate procedures, standards, and instructions
- Thoroughness of performance
- Identification and completeness of documentation generated during performance

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REFERENCES

USAF, 2004. *Final Base-Wide Plans for the Environmental Restoration Program.* Kirtland Air Force Base, New Mexico.

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Attachment 1

Resumes of Key Personnel

EXPERIENCE SUMMARY

Over 25 years experience in the construction industry as a Universal Operating Engineer. Received over 6,000 hours of specialized on-the-job and classroom training in heavy equipment operations and maintenance, surveying operations, supervisor's orientation, and hazardous waste operations. Lead foreman on several local, state, and federal projects and all have excellent safety records. Currently Construction Site Superintendent for Tetra Tech EC, Inc. for the last 9 years.

EDUCATION

Diploma, High School, 1977

TRAINING

New Mexico International Union of Operating Engineers and West Texas Apprentice Training - 1980-1984
M.M. Sundt Construction Company Supervisors Training Program -1988
40-Hours OSHA Hazardous Waste Worker Training -1993
8-Hour OSHA Hazardous Waste Refresher Training - Current
Supervisors Training Tetra Tech FW, Inc.
DOT Employee Training Tetra Tech FW, Inc.
Waste Management Employee Training
40-Hours ESS Cross Training Course (Environmental Safety Specialist) Tetra Tech FW, Inc. -1999
Loss Control Self Study Course - 1999
ACOE - Construction Quality Management For Contractors-2000
Project Management Training -Level 100
Project Management Training -Level 200
Construction Superintendent Training -2001
Supervising in the Matrix Training-2002
Superintendent Training – 2004
Better Business Series Class and Styles Guide –Rockhurst University Continuing Education Center 2004

CORPORATION PROJECT EXPERIENCE

Construction Site Superintendent, 08/04-Present
U.S. Army Corps of Engineers, LF- 002, Kirtland AFB, NM
Provided environmental support to Kirtland AFB for the installation of an evapotranspiration (ET) cover and erosion control system at Solid Waste Management Unit (SWMU) Landfill 002. This work is considered a Corrective Measures Implementation. Duties include balance of existing sub-grade material, import of engineered fill material, oversight of sub-contractor and supervision of 13 field crew craft employees.

Construction Site Superintendent, 08/04-Present
U.S. Army Corps of Engineers, LF- 001, Kirtland AFB, NM
Provided environmental support to Kirtland AFB for the installation of an evapotranspiration (ET) cover and erosion control system at Solid Waste Management Unit (SWMU) Landfill 001. This work is considered a Corrective Measures Implementation. Duties include balance of existing sub-grade material, Screening plant operations of engineered fill materials and rip rap, surveying, import of engineered fill material, oversight of sub-contractor and supervision of 47 field crew craft employees.

Construction Site Superintendent, 05/04 – 09/04
U.S. Army Corps of Engineers, LF- 44, Kirtland AFB, NM
Provided environmental support to Kirtland AFB for the investigation and removal action at the LF-044 (Fill Area South of Sewage Lagoons) site as Construction Site Superintendent. Excavated, removed and

disposed of over 8,000 cubic yards of buried asphalt debris and asbestos containing material (ACM). Installed a sediment retention basin and repaired existing erosion control features at the site. Project was completed on year ahead of schedule and 25% under budget.

Construction Site Superintendent, 08/03 – 09/04
U.S. Army Corps of Engineers, LF- 107, Kirtland AFB, NM
Provided environmental support to Kirtland AFB for the removal action at the LF-107 (Veterans Administration Hospital Demolition Debris Landfill) as Construction Site Superintendent. Excavated, segregated and disposed over 80,000 cubic yards of construction debris, asbestos containing material, and potentially infectious waste. In addition, 725,000 pounds of metal was recycled from the site. Managed sub-contractors for hauling construction debris. Project was completed 12% under budget.

Construction Site Superintendent, 05/03 – 06/03
Base Environmental, Kirtland AFB, NM
Provided construction supervision for golf course main pond repair activities. Repair eroded portions of banks of the pond. Placed additional riprap on areas where 40 mil HTPE liner had been exposed. Completed under budget with no incidents.

Construction Site Superintendent, 1/03 – 5/03
U.S. Army Corps of Engineers, LF-056, Kirtland AFB, NM
Provided construction supervision for site personnel, excavation of soil and disposal of solid waste that consisted of asphalt, concrete, bricks, metal debris and removal from four acre site, hauled to active base landfill for waste management disposal. Backfill site with topsoil for revegetation efforts. Job was completed ahead of schedule and under budget.

Construction Site Superintendent, 7/01-7/03
U.S. Army Corps of Engineers, ICM LF-08, Kirtland AFB, NM, CMI at LF 4,5,6, (LF08)
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision for constructing an evapotranspiration (ET) cover cap of thirty-six inches with construction of slopes and drainage systems on 76 acres. Completed under budget by $300,000.00.

Construction Site Superintendent, 7/01-11/01
U.S. Army Corps of Engineers, ICM LF-02, Kirtland AFB, NM
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision over site of a sub contact crushing rubble concrete which generated 181,000 cubic yards of reusable material to be used for sub-grade material at LF-02 and various sites on KAFB.

Construction Site Superintendent, 4/01-6/01
U.S. Army Corps of Engineers, Operational Facility Plan Modification LF-268 CMI at LF- 004, 005,006, (LF-008), Kirtland AFB, NM
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision for the relocation of the Civil Engineering facilities at LF-268 to another onsite location, reroute haul road bisecting LF-08 to eliminate safety concerns during ET cover construction and build a segmental retaining wall for the use as a municipal waste transfer station.

Construction Site Superintendent, 1/01-3/01
U.S. Army Corps of Engineers, Corrective Measure Implementation LF-01
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision of eight personnel during the first phase of site clean up which

included; crushing operations of surface rubble concrete. Scrap metals were also generated and recycled and 25,000 cubic yards of crushed concrete was also generated which will be used for sub-grade fill material.

Construction Site Superintendent, 9/99-1/01
U.S. Army Corps of Engineers, Remedial Action SWMU 97 Cannon AFB, NM
Under the Southwest Total Environmental Restoration Contract (TERC) at Cannon AFB, New Mexico, provided construction supervision of eight personnel during a site clean up which included tree trimming and removal, sub-contract ACM removal activities, separate and savage exposed rubble concrete and crush for future use, grading and drainage construction, site revegetation. Rubble concrete generated 16,000 cubic yards of material that will be used as fill material for Sewage Lagoon project at CAFB. Tree trimming were mulched and generated 100 cubic yards of wood chips. Scrap metal re-bar was also generated from the rubble concrete and recycled. This $ 1.3 million project was completed ahead of schedule by one month, under budget by $200,000 and with no lost time accidents.

Construction Site Superintendent, 08/99-09/99
U.S. Army Corps of Engineers, Interim Corrective Measure LF-08 Kirtland AFB, NM
Installation of 5,800 linear feet of silt fencing around base of LF-08 to prevent soil loss and erosion control.

Construction Site Superintendent, 07/99-08/99
U.S. Army Corps of Engineers, Interim Corrective Measure LF-02 and Area#4 Drainage Kirtland AFB, NM
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision for up to 38 craft personnel and subcontractors for corrective measures of Tijeras Arroyo adjacent to a landfill. Job scope included excavation and placement of fabric liner, construction of gabion baskets and filling with 4 to 8-inch rock, grade control structures, this project was completed under the remaining funding from ICM LF-02, which was under budget by $1.4 million, and with no lost time accidents.

Construction Site Superintendent, 07/99-8/99
U.S. Army Corps of Engineers, EOD Facility Fence, Kirtland AFB, NM
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision for installation of 6.5 miles of barbwire fence and gates around an Explosive Ordinance Disposal Facility. Job scope included surveying and reconstructing firebreaks around blast area, clearing and grubbing, and periodical maintenance. Project was completed ahead of schedule by two weeks and with no lost time accidents.

Construction Site Superintendent, 03/99-07/99
U.S. Army Corps of Engineers, Interim Corrective Measure LF-02, Kirtland AFB, NM
Under the Southwest Total Environmental Restoration Contract (TERC) at Kirtland AFB, New Mexico, provided construction supervision for up to 38 craft personnel and subcontractors for corrective measures of an arroyo adjacent to a landfill. Job scope included excavation and placement of fabric liner, construction of gabion baskets and filling with 4 to 8-inch rock, construction of spur dikes, construction of concrete drop structures and grade control structures, construction of an Oil/Water Separator, and repair and installation of a C900 12-inch water line. An audit by the Office of Federal Contract Compliance Programs for compliance with Affirmative Action requirements revealed no violations, and I-9 immigration forms were flawless. This $5.3 million project was completed under budget and with no lost time accidents.

Construction Site Superintendent, 3/98-2/99
U.S. Army Corps of Engineers, Holloman AFB, NM, Main Base Landfill Final Closure, SW TERC
As part of this $5.5 Million contract, provided construction supervision of up to 25 personal in the closure of this 176-acre landfill, placing approximately 600,000 ton's of imported material forming a cap of twenty-seven inches with construction of slopes and drainage systems. The scope of work also included the closure of an Asbestos dump area adjacent to the landfill and crusher operations at the base reuse area. Crusher operations recycled more than 70,000 tons of processed sized and screen material to meet base course specifications per base requirements. Was also responsible for overseeing subcontractors Borrow Pit and street resurfacing operations. Was instrumental in the start up and organization of the Base recycling effort in the collection and processing of waste raw materials, wood grinding, and Composting operation for the purpose of landfill re-vegetation/compost project. Project was completed ahead of schedule, under budget by $1.5 million and with no lost time accidents.

Construction Site Superintendent, 1/98-4/98
U.S. Army Corps of Engineers, Holloman AFB, NM, SW TERC Contract, 300 Pound Open Burn
Unexploded Ordinance Removal and Remediation and closure
Provided site supervision for this project. The scope was removal of unexploded ordinance and excavation of abandoned burn pits previously used for burning of old munitions. Mr. Juarez made a significant modification to the screening plant to enable increased production, while also improving the safety of the operation. Provided onsite design and oversight of construction of an Open Burn unit designed for the thermo treatment of UXO recovered on site. The project was completed without incident and under budget and ahead of schedule, with no lost time accidents.

General Foreman, 06/97-12/97
U.S. Army Corps of Engineers, Tetra Tech FW, Inc., Southwest Total Environmental Restoration Contract (SW TERC), Holloman AFB, NM, Sewage Lagoons Final Closure Project
Responsible for the supervision of 18 personnel in hazardous waste and construction operations on this 84-acre site. Project involved de-watering, stabilization of sludge, soil mixing, and back filling of six lagoons with approximately 140,000 tons of materials to project specifications. Extensive surveying and grade checking were also accomplished due to previously gained experience. Project has had no lost time injuries/accidents to date. Procured and maintained all heavy equipment needs and supplies.

PREVIOUS EXPERIENCE

Foreman, 05/97-06/97
George Harbison, Inc, El Paso, TX, AFL-CIO Affordable Housing Project
Responsible for supervision of craft in the "ground up" construction of a 100-unit apartment complex, including utilities, streets, and gutters. Performed oversight for all surveying for entire site layout.

Universal Operating Engineer, 01/95-12/95
State Of New Mexico, Department of Transportation, K.R. Swerdfeger Construction Inc., Clovis, N.M.

Responsible for the installation and demolition of telecommunications lines to include tie-ins.

Universal Operating Engineer, 03/90-11/95
Chevron Refinery, T&R Mechanical Inc, El Paso, TX,
Lead operator and supervisor in the demolition and construction of various structures, which included utility installation/rerouting.

Universal Operating Engineer, 09/89-10/89
U.S. Air Force, B&H Mechanical Inc, "Star Wars" Project, Oro Grande, NM
Responsible for the supervision and construction of a 10-mile, 12-inch water mechanical service line. Performed oversight of on-site grade checkers. Build sewage ponds and Mobil sewage treatment plant

Universal Operating Engineer, 11/88-08/89
U.S. Air Force, Burns Construction Company, "Star War" Project, Oro Grande, NM
Supervised the construction of access roads and support facilities for the project site.

Universal Operating Engineer, 02/88-10/88
State of New Mexico Department of Transportation, M.M. Sundt Construction Company, Deming, NM
Lead man for the Phase I and II Interstate 10 construction, which included crushing operations, bridgework, and new road construction. Oversaw grade checking and setting.

Universal Operating Engineer Foreman, 08/87-01/88
NASA, Sunset Grading and Paving Construction Company, NASA Space Center,
Responsible for the construction and survey control of new roadwork and miscellaneous site activities including sewage ponds construction.

Universal Operating Engineer and Foreman, 10/85-07/87
State of Arizona Department of Transportation, M.M. Sundt Construction Company, Phoenix, AZ
On various projects involving new road construction, flood control, drainage, and levy work a $ 60 million project. Responsible for crews up to 30 to 40 personnel and oversight of grade checking and setting on numerous projects.

Oiler, 08/84-10/84
Stearns-Rogers Construction Company, Lordsburg, NM
Responsible for the maintenance of all heavy equipment in the shutdown operations of a copper smelter mine.

Universal Operating Engineer, 06/83-04/84
U.S. Air Force, Granite Construction Company, RAMS Project, White Sands Missile Range, NM
Operator and grade checker in the construction of support facilities and roads for the project.

Universal Operating Engineer, 06/83-07/83
Stearns and Rogers Construction Co, Hurley, NM
Assisted in the demolition and reconstruction of a copper smelter.

Universal Operating Engineer, 12/82-01/83
New Mexico Steel Erectors, Las Cruces, NM
Assisted in the survey and construction of a correctional facility.
Corn Construction Company, Santa Rosa, NM 03/82-11/82
Grade checker and setter in the construction of new roads.

Universal Operating Engineer, 02/80-02/82
M.M. Sundt Construction Company, Hillsboro, NM
Assisted in the new construction of a copper tailing and mine dam.

PROFESSIONAL ACCOMPLISHMENTS

Outstanding Apprenticeship Award, IUOE Local 953 – 1984
Universal Operating Engineer, IUOE Local 953 – 1984
First Aid/CPR certified

DISCIPLINE CODES

16 Construction Manager, Y
51 Safety/Occupational Health Engineer, N

SKILL SET

Geoscience
Underground Storage Tanks/Refineries
Health Physics
Low Level Radioactive Waste
Regulatory Affairs
DOT

LANGUAGE SKILLS

Spanish Knowledge Level: Secondary: Fluent

JOHN M. MCBEE, P.E.

SENIOR ENGINEER / OFFICE MANAGER / PROJECT MANAGER

Education

MS, Geological Engineering, University of Missouri-Rolla, 1979
BS, Geological Engineering, University of Missouri-Rolla, 1973
BS, Geology, Texas A&M University, 1970

Professional Registrations

Professional Engineer (Civil): Wisconsin #E-23160, 1984; Ohio #E-64765, 2000 ; Kentucky #21331, 2000; New Mexico #16177, 2003

Continuing Education

USACE Construction Quality Management Certification April 2006
40-hr OSHA HAZWOPER: 1987
8-hr OSHA Refresher: September 2005
40-hr OSHA HAZWOPER: 1987
10-hr OSHA Construction Safety and Health Training: 1997

Professional Affiliations

American Society of Civil Engineers

Publications

McBee, JM. 1995. Factors influencing the selection of off-site versus on-site disposal of uranium mill tailings. Proceedings of ER 1995; Denver, CO. Department of Energy.
Abt, SR, KM High and JM McBee. 1991. Refined cap design for uranium tailings sites. Journal of Energy Engineering 117(2):71-87.
McBee, JM. 1988. Use of piezocone on UMTRA: a case history. Proceedings of the ASCE Convention; 1988; Nashville, TN.
McBee, JM and DP Gallo. 1986. Aquifer storage and recovery: a water supply alternative. Proceedings of the Wisconsin Section of American Water Resources Association Conference; 1986; Baraboo, WI.
Ilsley, RC, JM McBee and SB Fradkin. 1984. Characterization of rock conditions for the deep tunnel project in Milwaukee. Proceedings of the 25th U.S. Symposium on Rock Mechanics; 1984; Evanston, IL.

Mr. McBee has 28 years of consulting experience on a variety of environmental, construction and geotechnical projects for private, municipal and federal clients. He manages and provides engineering and hydrogeology expertise on environmentally related projects, including site characterization, remedial action design, remedial action implementation and regulatory compliance. He also applies his engineering experience on construction projects from initial site characterization to providing foundation and construction recommendations, through support during construction of various types of buildings and transportation facilities. Mr. McBee has provided the U.S. Environmental Protection Agency (EPA) with engineering assistance and technical oversight support from the remedial investigation stage through remedial design and remedial action implementation at various federal facilities. He has also served as site engineer, engineering manager of special studies, and project manager for the U.S. Department of Energy (DOE) Technical Support Contractor on Uranium Mill Tailings Remedial Action (UMTRA) project sites. Mr. McBee has conducted site characterization investigations and provided foundation design and earthwork recommendations on a variety of construction and transportation projects. He provided design and construction recommendations, including site preparation, subgrade evaluation, subgrade stabilization, structural fill placement and geotechnical design recommendations, for all portions of the proposed projects. Mr. McBee was a project engineer for the characterization and construction of deep and shallow tunnel projects for water and transportation systems.

CERCLA / RCRA Site Investigations

EPA Region 9 Federal Facilities Oversight Contract: San Francisco, California. Senior Engineer. Provided engineering support directly to the EPA and was a technical reviewer for the EPA for remedial actions under Comprehensive Environmental Response, Compensation and Liability Act at U.S. Department of Defense (DOD) facilities. These projects are part of base realignment and closure activities. Reviewed feasibility studies, facility assessment reports, remedial action work plans, sampling and analysis plans, draft record of decision, completion reports, long-term groundwater monitoring plans, quality control plans, technical specifications for remedial action cleanup and a plan of action for remediation of a former Leaking Underground Storage Tank (LUST) site. Engineering support for the EPA included review of removal actions, remedial designs, remedial actions and other technical memoranda. Selected projects included 1) evaluation and performance assessment of active groundwater treatment system using ultraviolet/oxidation technology, and 2) support of field activities for installation of a permeable reaction treatment wall using jet-grouting techniques (for placement of zero-valent iron) at a DOD site with tetrachloroethylene-contaminated groundwater.

- ***Proposed Remedial Actions Evaluation: Los Angeles, California.*** *Project Engineer. Evaluated the proposed remedial actions for the Principal Responsible Parties (PRPs) during litigation for selection of the preferred alternative for cleanup or containment of contaminated soils and refinery waste sludges. Evaluated site conditions (including groundwater and steep slopes), reviewed remedial investigation/feasibility study reports, evaluated three alternatives and made recommendations for selection of remedial action that would meet clean-up criteria. This report assisted the PRPs in overturning the costly alternative selected by the regulatory agencies by demonstrating that the materials could be stabilized in-place on a relatively steep slope through the use of slope stabilization techniques.*

EMBANKMENTS, DAM, AND IMPOUNDMENTS

- ***USDA-Natural Resources Conservation Service (NRCS): New Mexico****.* Senior Engineer / Project Manager. *Responsible for soil mechanics and geotechnical evaluations of flood retention dams and auxiliary spillways for the NRCS. The analyses were conducted for development of project supplemental watershed plans and environmental documents and assessment of proposed rehabilitation measures, if needed. As part of the engineering evaluation of exploratory borings were drilled for the dams and the auxiliary spillways. The following tasks were completed and included in a report summarizing the subsurface conditions and recommendations for rehabilitation of the dam, if necessary.*
  - Evaluated dam and foundation conditions
  - Analyzed slope stability of upstream and down stream slopes, including rapid drawdown conditions
  - Analyzed stability of dam foundation materials
  - Determined slope erodabililty parameters and subsurface conditions of auxiliary spillway; and
  - Determined watershed sediment yield parameters.

CONSTRUCTION INSPECTION / OVERSIGHT

- ***Construction Quality Control: New Mexico.*** Quality Control Manager for a construction project administered by the U.S. Army Corps of Engineers (USACE). The project was for construction of an evapotranspirative soil cover and erosion control features for a landfill covering approximately 40 acres on a U.S. Air Force Base. Responsibilities included daily inspections, sampling and quality control of both in-place and laboratory testing, preparation of submittals for USACE review and approval, and full compliance with USACE Quality Control System protocols.

- ***Construction Inspection/Oversight: Ohio and Kentucky.*** *Senior Engineer. Provided oversight of quality assurance/quality control for testing and inspection services on several construction projects. Supervised technicians and reviewed field and laboratory test reports during testing and inspection services on projects for earthwork, auger cast and driven pile foundation installation, concrete reinforcing steel placement and cast-in-place concrete.*

- ***Construction Inspection/Oversight: Atlanta, Georgia.*** *Staff Engineer. Monitored construction of foundation installations for buildings, parking structures and a sewage treatment structure. Performed vibration monitoring of highway construction activities to prevent damage to adjacent structures.*

NEPA PROCESS AND DOCUMENTATION (EISS AND EAS)

- ***DOE UMTRA Surface Remediation Project: Albuquerque, New Mexico.*** *Site Manager. Responsible for management and creation of environmental assessments on state, federal and tribal lands. These NEPA documents evaluated impacts from remedial investigations and restoration projects undertaken to permanently stabilize uranium mill tailings within engineered impoundments and clean up associated groundwater efforts. Participated in numerous public meetings to gather public input on these activities.*

ENVIRONMENTAL SITE INVESTIGATIONS

- ***DOE UMTRA Surface and Groundwater Remediation Project: Albuquerque, New Mexico.*** *Site Manager. This project dealt with characterization and remediation phases for soil and groundwater clean-up at sites contaminated by tailings resulting from uranium milling operations. As a site project manager for several UMTRA projects, directed technical support to the DOE to evaluate site environmental (soils, surface water, groundwater and radiological) and geotechnical conditions, establish priorities and adjust resources to meet all environmental clean-up standards (including NEPA and EPA*

groundwater standards) and health and safety requirements. Supervised and directed day-to-day activities of technical staff to adhere to schedules and maximize cost benefits to the DOE, using detailed project management and control systems (cost, schedules, resources and performance monitoring). Site budgets (DOE total) for characterization, design and construction for surface and groundwater remediation programs ranged from $19 million to more than $50 million each.

HYDROCARBON / LUST INVESTIGATION / MITIGATION

- ***USTs Removal/Replacement Construction Oversight: California.*** *Senior Engineer. Provided construction oversight during removal and replacement of six USTs (up to 20,000 gallons in size) at two hospitals. Responsibilities included oversight of construction subcontractor, liaison with hospital engineering staff to minimize impact to hospital operations, environmental monitoring, health and safety compliance, report preparation and permit/regulatory compliance.*

- ***Engineering Assessment and Corrective Action Plan, Municipal Client: California.*** *Senior Engineer. Provided engineering assessment and development of alternatives for a corrective action plan for groundwater compliance of a site contaminated by LUSTs.*

LANDFILL INVESTIGATION / ENGINEERING

- ***Landfill Investigation/Engineering Services, Commercial Client: Arkansas****. Senior Engineer. Performed a series of geotechnical materials evaluations for closure of an existing landfill and construction of a new industrial cement kiln dust landfill for a private client. Evaluated on-site soils and rock for potential use as landfill liner and cover materials. Prepared closure and post-closure and groundwater monitoring plans for the permit application for the new landfill.*

MINE PLANNING AND CLOSURE

- ***Uranium Evaporation Pond Reclamation and Closure Plan Review: New Mexico****. Senior Engineer/Project Manager. Aided in the preparation of a closure plan for reclamation of evaporation ponds totaling over 250 acres and approximately 1.3 million cubic yards of sediment for a uranium milling operation for submission to the Nuclear Regulatory Commission. Included in the closure plan were an evaluation of subsurface conditions for siting of the disposal cell, design for construction, cover design, stability analyses, and erosion protection design of the embankment, surface water drainage, and re-contouring of the evaporation ponds area.*

- ***Uranium Mine/Mill Reclamation: New Mexico.*** *Senior Engineer. Provided recommendations and engineering design of erosion protection systems to the NRC for the Rio Algom Mining Company Quivira Mine Ambrosia Lake Mill Site. The project included design of erosion protection systems for tailings pond embankment slopes, embankment toes, evaporation ponds, and open channels. Conducted an evaluation of the migration potential of an arroyo adjacent to the mill site to assess potential impacts to the long-term stability of the disposal cell.*

PETROLEUM RELEASE INVESTIGATIONS AND CORRECTIVE ACTIONS

- ***Remedial Design and Remediation Oversight: Maljamar, New Mexico.*** *Senior Engineer. An area within the gas plant had historically been used for storage of non-essential and out-of-service equipment. Investigations by Tetra Tech revealed that the soil contained elevated total petroleum hydrocarbons in sampled strata and low levels of benzene, toluene, ethylbenzene and xylenes. Developed a remediation strategy to prevent infiltrating surface water contacting the hydrocarbon-impacted soils by placement of a manufactured geomembrane over the impacted soils and backfilling with native soils. This remediation strategy was presented and agreed to by the New Mexico Oil Conservation Division (OCD). Responsibilities included design, construction oversight and environmental monitoring of remedial activities. Compiled and submitted a completion report detailing construction activities and monitoring. After review by the OCD, the site was designated as requiring No Further Action.*

- ***Remedial Design and Remediation Oversight: Eunice, New Mexico.*** *Senior Engineer. Contamination impacts at depth were discovered after partial removal of hydrocarbon-impacted soils at the site. Developed an alternative remediation strategy to prevent infiltrating surface water contacting the hydrocarbon-impacted soils by construction of a clay cover and backfilling with native soils. After consultation with the New Mexico OCD, this strategy was approved.*

Responsible for design, construction oversight and environmental monitoring of remedial activities. Compiled and submitted a completion report detailing the construction activities, testing and monitoring. Upon review by the OCD, the site was designated as requiring No Further Action.

- ***Sludge Pond Stabilization and Closure Design/Oversight: Ponca City, Oklahoma.*** *Senior Engineer. Designed material stabilization methods, developed a closure plan and provided closure construction oversight for two phases of a former refinery waste sludge pond designated as a Corrective Action Management Unit (CAMU). The site is under the regulatory purview of the Oklahoma Department of Environmental Quality. The closure activity consisted of stabilization of unit contents, and placement of additional site wastes and a clay cap cover system. Cost savings were provided to the client through pre-loading of the CAMU contents with refinery waste soils.*

REGULATORY COMPLIANCE

- ***DOE UMTRA Surface and Groundwater Remediation Project: Albuquerque, New Mexico.*** *Site Manager. Responsible for several UMTRA project sites that required preparation of conceptual designs, ensuring regulatory compliance and coordinating with the NRC, state public health/environmental departments and the affected public. Coordinated preparation, approval and final publication of site-specific documents. Typical site documents included remedial action plans, NEPA documents, baseline risk assessments, water sampling and analysis plans, site observational work plans and long-term surveillance plans.*

- ***Airport UST Regulatory Compliance, Federal Aviation Administration: California.*** *Senior Engineer. Performed an engineering evaluation for regulatory compliance of USTs at an airport facility. Performed system tests, evaluated monitoring system for compliance with federal and state requirements, acted as liaison with the state regulator, prepared report and documented compliance.*

REMEDIAL DESIGN

- ***DOE UMTRA Surface Remediation Project: Albuquerque, New Mexico.*** *Project Engineer/Site Manager. Responsible for several UMTRA project sites that required site characterization, analysis of alternatives and preparation of remedial design recommendations and conceptual designs. Coordinated preparation, approval and final publication of site-specific documents, such as remedial action plans and long-term surveillance plans. After the projects were turned over to the remedial action contractor, responsibilities included design review, value engineering and construction monitoring/audits.*

RESEARCH AND DEVELOPMENT

- ***DOE UMTRA Surface Remediation Project: Albuquerque, New Mexico.*** *Engineering Manager for Special Studies. Provided technical oversight of staff and managed the budgets and schedules for several special study investigations, each requiring up to 1,000 man-hours. These studies were concerned with disposal cell cover design enhancements, design performance, or design alternatives for remedial actions. Accomplishments included significant revision and expansion of the project's technical approach document (300 pages in length) to re-establish the project's multi-disciplinary approach for remedial action design, site selection, site characterization and compliance validation in response to EPA groundwater standards. These studies included computer modeling, laboratory testing and bench-scale testing of material properties and performance.*

SOIL AND FOUNDATION INVESTIGATIONS

- ***Soil and Foundation Investigations: Alabama, Ohio, Kentucky.*** *Senior Engineer. Conducted geotechnical explorations for various clients and types of facilities. Provided earthwork recommendations, including site preparation, subgrade evaluation, subgrade stabilization, structural fill placement and geotechnical design recommendations, for all portions of the proposed projects. Provided geotechnical engineering expertise for design and construction prior to expansion of several water and wastewater treatment plants and water distribution systems.*

- ***Subsurface Evaluation and Design Recommendations, Commercial Client: Ohio.*** *Senior Engineer. Performed an evaluation of rock and soil conditions and provided recommendations of design parameters for design of a foundation and retaining wall system integrated with the building on two sides. Provided ongoing support through construction to solve problems that developed due to a 20-inch municipal water main and requirements for stabilization and relocation. Designed an earth-reinforced retaining wall system for construction of a relocated section of the water main through a rock cut and a lateral restraint for the water main.*

- ***Chemical Manufacturing Facility Expansion Geotechnical Investigation: Ohio.*** *Senior Engineer. Conducted the geotechnical investigation and analysis for a major expansion of a chemical manufacturing facility. This project involved construction of over 10 buildings, plus storage tanks, a cooling tower, liquid containment pits, extension of piping bridges, an access road landsite regrading. Utilized previous boring information and drilled 38 borings to get location-specific information for structure-specific design recommendations and constructability concerns.*

- ***Geotechnical Investigations, Metropolitan Atlanta Rapid Transit Authority: Atlanta, Georgia.*** *Staff Engineer. Conducted field and office engineering aspects of geotechnical investigations for rapid-rail underground, aerial and at-grade line sections and stations. Duties included field reconnaissance of proposed borings, drilling supervision, sample collection, geologic analyses and report preparation.*

TUNNELS, PIPELINES AND UTILITIES

- ***Pollution Abatement Program Geotechnical Engineering Services: Milwaukee, Wisconsin.*** *Project Engineer. Provided geotechnical services for a series of projects to design and construct 14- to 30-foot diameter, up to 350-feet-deep tunnels, dropshafts, access shafts and a pump station facility in soil, rock admixed face conditions for the Milwaukee Water Pollution Abatement Program (MWPAP):. Managed and executed geotechnical investigations and report for a 4-mile system of tunnels and drop shafts. Planned drilling and testing, analyzed results and prepared the report, which included design recommendations and constructability assessments. Supervised drilling in soil and rock, sample collection and logging, in situ testing and piezometer installation. Assisted in the investigation phase of several near-surface collector sewer systems for the MWPAP. Also predicted the area of influence from proposed tunneling and analyzed building foundation support requirements for one collector system. Performed detailed logging and sample testing of rock core to assess tunnel stability.*

- ***U.S. Highway 83 Tunnel Characterization and Geotechnical Design: Clearwater Junction, Montana*** *Senior Engineer. Provided characterization and geotechnical design recommendations for construction of a 200-foot long cut-and-cover tunnel for a wildlife over-crossing of U.S. Highway 83. Provided design recommendations for the tunnel lining, earth pressures, structure foundations and construction considerations. Developed seismic design parameters (response spectra) for the structure according to U.S. Army Corps of Engineers guidelines for concrete structures. Work performed for Montana Department of Transportation.*

- ***Subway Station Geotechnical Engineering Services: Atlanta, Georgia.*** *Staff Engineer. Performed mapping of subway station cavern and line tunnels in rock and shield-driven compressed area mixed-face tunnels with emphasis on roof and wall stability for Metropolitan Atlanta Rapid Transit Authority. Monitored performance of support methods and grouting programs and related observations to surface and near-surface geotechnical instrumentation. Responsible for the blast monitoring network to record ground motion and air blast generated by underground construction of rail station in downtown Atlanta.*

PROFESSIONAL EMPLOYMENT HISTORY

2002 – Present	*Senior Engineer/Project Manager/ Office Manager, Tetra Tech, Inc.*
2000 – 2002	*Senior Engineer/Project Manager, CH2M Hill, Inc.*
1998 – 1999	*Senior Engineer, QORE Property Sciences*
1987 – 1998	*Senior Project Engineer/Project Manager, Roy F. Weston, Inc.*
1981 – 1985	*Project Engineer, STS D'Appolonia Ltd.*
1979 – 1981	*Staff Engineer, Law Engineering and Testing Company*

Ms. Pamela J. Moss
Program Manager

EXPERIENCE SUMMARY

Twenty-eight years experience in environmental consulting, and analytical and environmental chemistry. Experience includes nine years of environmental project management experience; sixteen years project chemistry support, laboratory quality assurance, data evaluation, and data management; and eight years of environmental analytical laboratory experience. Currently serving as a delivery order and task manager, program chemist, and quality assurance manager for CERCLA and RCRA regulated hazardous waste sites for federal and commercial programs. Responsible for managing site assessments, site investigations, remedial actions, feasibility studies, engineering evaluations, long-term groundwater monitoring, and compliance monitoring and sampling programs. Extensive knowledge and experience implementing Federal environmental programs in accordance with U.S. Army Corps of Engineers (USACE) Scope of Services, Air Force Center for Environmental Excellence (AFCEE) Technical Guidelines, and U.S. Environmental Protection Agency requirements, protocols, and analytical methodologies.

EDUCATION

BS, Chemistry/Food Science, Purdue University, 1977

TRAINING

40-Hour OSHA Hazardous Waste Training, 29 CFR 1910.120 H&S - 1990
8-Hour OSHA Hazardous Waste Refresher Training – Current
Tetra Tech FW, Inc. Project Management Training Level –100, -200 – 1997/2000
Tetra Tech FW, Inc. Negotiation Skills Training - 2001
Waste Management Training, 40 CFR 265.16 – 2002 and updates
DOT/HM-126F HAZMAT Training, 49 DFR 172, Subpart H – 1998 and updates
Certified Quality Auditor Training – 1995
Data Quality Objectives/Data Quality Assessment Workshop - 1997
American Chemical Society - Environmental Laboratory Data Quality Assurance -1998

CORPORATION PROJECT EXPERIENCE

Task Manager, Program Chemist, 1994-Present
U.S. Army Corps of Engineers, Omaha District, TERC 4
Provide task management support for this $150 million HTRW contract in support of Holloman, Kirtland, and Cannon Air Force Bases in New Mexico. Awards include 41 delivery orders with multiple task order in each. Task manager for 7 years supporting a $350K per year sampling and analysis compliance monitoring task including RCRA hazardous waste storage facility, NPDES permit, drinking water, open detonation unit, remedial systems, and site investigation projects at Holloman AFB. In addition, perform as task manager for a $800K per year long-term groundwater monitoring (LTM) program at Kirtland AFB. Responsible for semiannual and quarterly sampling, chemical analysis, and reporting activities for 40 monitoring wells included under the LTM. As Program Chemist for all task orders associated with this contract, responsible for development of project data quality objectives, development of data collection quality assurance plans, management and auditing of laboratory subcontractors, oversight and management of data validation and ERPIMS database deliverables, evaluation and assessment of analytical data and reporting.

Delivery Order Manager, Program Chemist, 1999-Present
U.S. Air Force Center for Environmental Excellence, 3P A-E and 4P A-E Contracts
Manager for 11 delivery orders valued at $10M at Andersen Air Force Base, Guam; and one delivery each at Barksdale, FE Warren, Kirtland, and Tyndall Air Force Bases totaling $1.5M. Responsible for technical and financial management, and implementation of engineering evaluations/cost analysis, remedial investigation feasibility studies, RCRA SWMU assessments, groundwater monitoring, landfill

maintenance operation, and base-wide plan documents. Provide program chemistry and quality assurance (QA) support for this $480M world-wide Air Force Base contract which includes environmental restoration, regulatory compliance, pollution prevention, conservation, planning, design and construction management. Managed and currently providing chemistry and QA support on this contract in excess of $4M for analytical chemistry under numerous delivery orders. Responsibilities include implementation of overall program and project-specific QA procedures and data quality objectives, management of laboratory subcontractors, data validation and ERPIMS data deliverables.

General Services Administration (GSA), Program Chemist, 1999-present
Denver Federal Center, Colorado, Federal Highways Administration (FHWA)
Provide program chemistry, chemical QA, and laboratory and data management support for the Denver Federal Center (DFC) site-wide groundwater monitoring, background characterization, Area 16 investigation, and Interim Measure #2 operation and maintenance programs. As lead chemist for this contract, responsible for development of project data quality objectives, data collection plans, data validation, and electronic data management using the DFC Database Management System. Responsible for implementation of the Quality Assurance Project Plan for the DFC Site-Wide RCRA Facility Investigation for project-specific work, and laboratory subcontractor management in excess of $1M in analytical work.

Program Chemist, 1993-Present
U.S. Fish and Wildlife Service – Grand Calumet, Roxanna Marsh, Grant Kohrs Ranch, Amchitka Island, Great Swamp National Wildlife Refuge, Sachuest Point NWR, Trustom Pond NWR, Patuxent Chemical Leachfield, Kenai Alaska, D'Arbonne and Ouachita NWR
Responsible for development of project data quality objectives; field sampling and quality assurance plans for nonhazardous and hazardous preliminary site assessment, site inspection, remedial investigation and design, and feasibility study, management and oversight of subcontractor labs; and management of database development, validation of analytical data, and data assessment and interpretation. Designed presentation and provided instruction on development of data quality objectives, analytical lab selection, analytical methods, and data validation for 2 day CERCLA training program in support of USFWS refuge management and Service Pollution Control Office.

Task Manager, Project Chemist, 1991-1993
Oak Ridge National Laboratories, Low-Level Mixed Waste Drum Characterization, Oak Ridge, TN
Managed chemical and process knowledge characterization of 1,000 low-level radioactive waste containers. Implemented the process knowledge approach as an alternative to analytical testing, resulting in a cost savings to the client. Responsible for development of the field sampling plan and the QA plan; coordinated project tasks and personnel; quality assurance of all drum characterization process knowledge, analytical data, and deliverables; and chemistry oversight and technical review of all waste materials in accordance with RCRA regulations to determine ultimate disposal options. Involved with revising the current waste management tracking system, and establishing and implementing a waste generator training program at Oak Ridge National Laboratories.

Program Chemist, 1990-2000
U.S. Army Rocky Mountain Arsenal, Colorado, Continuous Air Quality Monitoring and Meteorological Program, Fluoroacetic Acid Volume Refinement Soil Sampling Program, In-situ Biotreatability Program, Supplemental Field Study, Commerce City, CO
Responsible for chemistry and analytical support for field sampling activities; laboratory coordination, oversight, and auditing; and analytical data evaluation for report preparation. Responsible for analytical support for Chemical Data Assessment Program including 20,000 particulate and gaseous air samples for modified EPA analyses, and 10,000 water and soil samples for routine and non-routine chemical analyses.

Also responsible for technical evaluation, coordination, and oversight of analytical subcontractors, auditing of subcontractor labs; and coordination and management of IRDMIS deliverables.

Project Chemist, 1991-1998
U.S. Army Environmental Center, Tooele Army Depot-South and Dugway Proving Ground, UT
Performed laboratory coordination for field data collection activities on this $25 million RFI, where responsibilities included technical evaluation and laboratory procurement; laboratory oversight, performance auditing, and quality assurance of analytical methods for $5 million of subcontracted analytical work. Responsible for management of data validation, project database management, and data assessment for report preparation. Coordinated and evaluated the analytical data for use in waste management program. Provided client with substantial cost savings as a result of our timely and efficient waste management procedures.

Project Chemist, 1991-1994
U.S. Bureau of Reclamation, Krejci Dump Site, Ohio, Bingham Creek, Utah, Warren Air Force Base, Wyoming
Provided support in developing work plans, field sampling and analysis plans, and quality assurance project plans. Provided a cost savings to the client by performing on-site compatibility testing of samples from more than 800 waste drums and off-site confirmation analysis for the cradle-to-grave remediation at the Krejci Dump site. Responsible for laboratory coordination, data review and verification, reporting, documentation, and project database management. In addition, performed as the project manager for the Bureau of Reclamation Wright Patterson data validation task. Responsible for project coordination, budgets, labor, schedules, and quality control. Designed and implemented an on-site laboratory that resulted in a significantly reduced analytical program and a $50,000 savings.

Project Chemist, 1992
Rocky Flats Plant, Colorado
Supported the data analysis, data verification, and report preparation for the 1990 Surface Water and Sediment Geochemical Characterization Report at the Rocky Flats Plant in Colorado, a nuclear weapons production facility. This report documents the analytical results of samples collected during 1990 to monitor releases. Primarily involved with the investigation of questionable items for organic, inorganic, and radiochemical data. Upon completing this review, worked with EG&G Rocky Flats staff to document the needed changes to the database and to verify data validation for the final report.

PREVIOUS EXPERIENCE

Gas Chromatography Section Manager, Hunter Environmental Services, Denver, CO – 1989 - 1990
Environmental Laboratory Supervisor, PACE, Denver, CO – 1988-1989
Assistant Organic Section Manager, Truesdail Laboratories, Tustin, CA – 1985 - 1988

Responsible for managing and supervision of all aspects of the organic gas chromatography laboratory section operations which conducted trace analysis of pesticides, herbicides, polychlorinated biphenyls, and volatile organic compounds using USEPA protocol. Provided training for new employees, scheduled all gas chromatography work, budgeted manpower hours, responsible for maintaining laboratory equipment, and reviewed the quality of all data generated by the section. Responsible for laboratory project management for two drinking water contracts for the Department of Health Sciences that involved coordinating sampling, scheduling, analysis, data reporting, and client interaction.

Chief Chemist/Laboratory Supervisor, SGS Control Services, New Orleans, LA – 1981 -1985
Laboratory Supervisor, Barringer Resources, Arvada, CO – 1878 - 1981
Performed gas chromatography and mass spectrometry analysis of pesticides, fumigants, transformer oils, petroleum, and petroleum products using USEPA methodology. Responsible for managing extraction

and analysis sections of laboratory, maintaining and calibrating laboratory equipment, performing quality control, developing and improving analytical methods, and client interaction and reporting.

PUBLICATIONS & PRESENTATIONS

PUBLICATIONS

Moss, P., Wheelock, R. Quantitative On-Site Analyses of Total Recoverable Petroleum Hydrocarbons During A Resource Conservation and Recovery Act Facility Investigation at Holloman Air Force Base. 1995.

Armstrong, J., Edson, H., Huston, K., Kutchenreiter, M., Ley, T., Lucas, P., Moss, P. Air Quality and Meterological Monitoring at the Rocky Mountain Arsenal. 1995.

Armstrong, J., Booth, M., Kutchenreiter, M., Moss, P., Winslow, M. Quality Assurance Activities Associated with Passivated Canister Sampling at the Rocky Mountain Arsenal. 1996.

PRESENTATIONS

“FE Warren Air Force Base 2004 Industrial Effluent Waste Water Study”, SAME Frontier Post, January 2006.

"Successful Implementation of the AFCEE PE Program", AFCEE Pollution Prevention Conference. August, 2002.

"CERCLA Training: A Review Focused on USFWS Sites", U.S. Fish and Wildlife Service, Pollution Control Office. June, 1996.

PROFESSIONAL AFFILIATIONS

Society of American Military Engineers, Frontier Post
Purdue University Alumni Organization

DISCIPLINE CODES

Administrative: 001, N
Chemical Engineers: 003, N
Chemical Experts: 136, Y

SKILL SET

CHEMICAL SCIENCE
Atomic Absorption
Chemical Data Acquisition Plan
Drum Compatibility Testing
Deputy Project Manager
Drum Sampling
Field/Mobile Laboratory Oversight
Field QA Audits
Feasibility Study
Field Sampling and Analysis Plan
Gas Chromatography
Gas Chromatography/Mass Spectrometry
Geotechnical Sampling
Volatile Headspace Analysis
Inorganics
Infrared
Laboratory QA Audits
Organics
Proposal Lead
Quality Assurance Officer
Quality Assurance Plan
Risk Assessment
Resource Conservation Recovery Act
Remedial Action
Remedial Investigation
Remedial Investigation/Feasibility Study
Site Characterization
Task Leader
Wet Chemistry
Work Plan

EXPERIENCE SUMMARY

Twenty-five years experience in civil construction, remediation and environmental projects.

EDUCATION

AA, Computer Training, Bakersfield Vocational College, 1974
AA, Geology, Engineering, Fresno City College, 1970
AA, Mechanical & Map Drafting, Bakersfield City College, 1972
AA, Mechanical Engineer/Geology, Bakersfield City College, 1970

REGISTRATIONS/CERTIFICATIONS

TRAINING

10 Hours/Superintendent Training - April 2000
Annual Refresher/Hazardous Waste Operations & Emergency Response - February 2000
2 Day Course/Pre-Operational Assessment Process - April 2000
8 Hr Authorized Entrants, Attendants, Entry Supervisor/Permit Required Confined Space Entry - February 2000
8 Hr/Respiratory Training - February 2000
DOT Safe Transportation of Hazardous Materials - February 2000
Bloodborne Pathogens -February 2000
Control of Hazardous Energy - January 1998
Lead Safety Awareness - February 2000
Trenching and Excavation - February 2000
Hazardous Material (40hrs plus 8hrs Supervisor Training)
Refinery BAT Training
Competent Person Shoring
20 Hours/Radiological Worker II - May 2000
8 Hour/Chemical Accountability School - June 2000
8 Hours/USBPA Method 22 Dust Emissions - June 2000
Registered Environmental Assessor/REA (expired)

CORPORATION PROJECT EXPERIENCE

2003 – 2005 Alcoa, Reynolds Metals. Troutdale, Oregon; Reduction Plant, Smelter Remediation, Construction Manager
Provided estimate and proposal assistance, scope, schedule, budget, subcontractor oversight, and client point of contact for a single point of authority. This contract is valued at $11M to $29M with salvage and equipment asset recovery. Project elements included demolition and remediation of 110 acres on the plant site and 25 acres of building structures and support infrastructure. Waste steams included PCBs at TSCA levels, asbestos containing material, lead, coal tar pitch (PAHs), beryllium, mercury, spent potliner (RCRA KO88), fluoride, hydrocarbons, and chlorinated solvents.

Site-specific issues included:
Robertson Siding
The siding was composed of 2 layers of a tar coating containing 11,000 to 17,000 ppm PCB and a fiber mat of asbestos totaling approximately 340K sq ft on 25 buildings. Seventy-two roof ventilators were fabricated out of the siding. The siding material had flaked off and contaminated interior dust and painted steel surfaces and the soil adjacent to buildings. Concentrations in the soil averaged 6 ppm PCBs. The siding removal was performed per asbestos abatement requirements and disposed of in a subtitle D landfill.

Galbestos Roofing
The roofing consisted of approximately 225K sq ft of roofing on 10 buildings, composed of an asbestos fiber mat and a single coat of PCB-containing tar. Roofing removal was performed per asbestos abatement requirements with disposal in a subtitle D landfill.

Asbestos
Thirty-nine thousand windows in the plant were held in place with an Asbestos Containing Material (ACM) glazing compound. Five-hundred and fifty thousanbd sq ft of the Robertson Galbestos siding incorporated asbestos fiber mats in their construction. Asbestos was also present in the floor tile. Provided insulation abatement to steam lines and flange gaskets and removal and abatement of the plant's 20K linear feet of underground water distribution transite pipe.

Regulatory Issues: This was a Superfund and CERCLA site\

2002- 2003, Boeing, Mather Field, Sacramento Ca. Design Build Water Treatment Plant for Perclhorate Treatment and Conveyance Pipelines from existing wells; Construction Manager
Assisted in the final design and proposal estimate, procurement, subcontract agreements, scope, schedule, budget, and kick off of construction. The total contract amount was $14M. Perchlorate was one of the major waste streams and the major project elements included the design/build of a water conveyance system from existing wells and another conveyance system for an off site water treatment plant (including the treatment technology). Other project elements included permitting, right-of-way agreements, design and construction of the control building, installation of conveyance piping, design and construction of canal crossing bridges, and construction of horizontal borings and under crossings.

Site-specific issues included: Pipe line right-of-way agreements from tenants of the county government-owned and development property; Permit agreements from the county government and regional water quality board; Canal and right-of-way conflicts for the water treatment technology.

2002, US Navy Hunters Point Navy Shipyard, San Francisco CA, Construction Manager
Proposal estimate and work plan, subcontractor oversite, and acting client point of contact for the site. The contract was estimated at $11.4M. Waste streams included asbestos, hydrocarbons, PCBs, Low Level Radioative Waste (LLRW), RCRA-restricted wastes, and lead. Major project elements involved environmental survey of the site structures; identification, characterization and mitigation of all waste streams; selective demolition; and preparation of the site for turn over to the City of San Francisco.

2001-2002, US Navy Point Molate Navy Fueling Facility. Point Molate CA, Construction and Site Manager.
Worked on the estimate, proposal, and work plan, provided subcontractor over site, and was the site point-of-contact for this $3.2M project. Waste streams included hydrocarbons, ACM, PAHs, and lead. The project consisted of remediating the construction debris on a steep hillside for landfill closure and sale to the City Of Richmond, including waste stream removal; leach ate collection, wetland mitigation, grading, storm water control structures, extensive erosion control, well drilling, landscaping, hydro-seeding, rip-rap placement, transit pipe removal, road construction, fencing, and underground utility installation. Most of the work was performed through heavy rain fall of over a foot in four months. Also, this was a high-visibility project as the toe of the slope's footprint was at the edge of the San Francisco bay.

2000 –2001, Gibson Refinery, Waste Recycling Facility Solids and Liquid, Bakersfield, CA. Construction and Site Manager.

Prepared the estimate and work plans and oversaw the subcontractors, as well as ensuring environmental compliance on this $1.6M contract. Contaminants included hydrocarbons, ACM, PAHs, lead, PCBs, lab packs, and RCRA waste. Work was performed under an Emergency Cleanup Order by the Department of Toxic Substance Control. Remediated liquids and solid waste streams from the multi-tank refinery, including support structures. Demolished the refinery to surface grade level. Stabilized and installed erosion control measures on existing contaminated stockpiles.

2000- 2000, US Dept. of Energy. Fernald Nuclear feed Plant, Fernald, OH. Civil and Mechanical Superintendent.
Reviewed plans, mobilized the site, and created the work plans. Oversaw multiple subcontractors and craft. Also worked on the schedule, scope, budget, safety plans for this $54M contaminated with radon and LLRW. Constructed construction support facilities, performed site grading while avoiding underground utilities, constructed concrete storm water protection, foundations and slabs for the new handling facility, pouring over 5K cy of concrete. Also performed selective demolition, mechanical piping and erosion control installation, surveying, while referring to the as-built drawings

Site Superintendent, October 2000 -Present
Gibson Environment, Gibson Environment Project, Bakersfield, CA
Use 25 years of civil construction experience, remediation, and environmental projects to perform responsibilities of Construction/Site Superintendent on demolition and remediation of miscellaneous hazardous wastes on Gibson Environmental Project. Responsibilities include: overseeing subcontractor's (demolition and civil) on site; site health and safety; writing work plans; daily briefings; preparation of cost estimates for additional work; and implementing work according to the site schedule, health and safety plan, and work plan.

Regulatory Issues: Dept. of Toxic Sub. Control; Kern County Environmental Health Department; San Jaquin Air Resource Board.

Civil Superintendent, April 2000 - October 2000
Fluor Fernald, Silos 1 & 2, Hamilton, OH
Constructed various civil facilities, wrote site-specific Safe Work Plan, contract administration, scheduling, performed various managerial duties while those positions were being filled.

Regulatory Issues: Ohio EPA

PREVIOUS EXPERIENCE

Sales Representative, Estimator, Project Manager, 1998-2000
Western Farm Service, Watson Ville
General Contractor-Excavated, loaded transport, various impacted soils.

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

Estimator, Project Manager, Site Superintendent, 1999
AT&T, Various sites in California and Western States
Tank removal at various sites. Retrofited existing systems.

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

Estimator, Project Manager, Site Superintendent Subcontractor to CH2M Hill, 1999
Pacific Gas & Electric, Brisbane, CA
Excavating, handling, stockpiling, hazardous soil, ply nuclear aeromatics and lead. Approximately 19000 cy includes underground improvements and site grading. Off site transportation and disposal-project unfinished. (Contract bid $825,000)

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

Estimator, Project Manager, Site Superintendent, 1999
Casmalia Resource and Foster Wheeler Environmental-EPA, Casmalia, CA
Construct butress (silver fill) phase one of four pond closures-project unfinished (-$150,000 each phase).

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

Sales Representative, Partial Estimator, 2000
DTSC-Gibson Environmental, Bakersfield, CA
Removal of hazardous liquids from various tanks. Transportation and disposal. (-$1,300,000 plus time and material).

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

Estimator and Subcontractor to Jacob Engineering and Unocal, 2000
Avila Beach Phase II, Avila Beach, CA
Selective demolition, excavation, transporting, decontaminating, importing, compacting, grading, surfacing, hydro seeding-project unfinished.

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

Estimator, Project Manager, Site Superintendent and Subcontractor to Holguin Fahan and Associates, 2000
Goleta Water District, Goleta, CA
Demolition, excavating, construction bio vent stockpiles, shoring, backfilling, grading, surface concrete, and reinstall utilities. Project in phase two of four. (#308,000 plus time and material).

Regulatory Issues: Lifetime Job Experience with the following regulatory agencies: EPA, US Dept of Wildlife Fish and Game, US Coast Guard, Air Force, Navy, Army, FBI, Dept. of Toxic Substances Control, Regional Water Quality Control Boards, Air Pollution Control Districts, Air Quality Management Districts, various local environmental health departments, fire departments, and police departments.

PUBLICATIONS & PRESENTATIONS

PROFESSIONAL ACCOMPLISHMENTS

Received letter of commendation from Ohio EPA for work at Fernald Silos 1&2 Project, Hamilton, OH.

PROFESSIONAL AFFILIATIONS

DISCIPLINE CODES

12 Civil Engineer, N
16 Construction Manager, Y
15 Construction Inspector, N
18 Cost Engineer/Estimator, N
30 Geologist, N
55 Soils Engineer, N
56 Specifications Writer, N
57 Structural Engineer, N
38 Land Surveyor, N
60 Transportation Engineer, N

SKILL SET

AIR SCIENCES
Air Quality Permitting
Ambient Monitoring
Boiler Design
Continuous Emission Monitoring
Database Management
Emission Inventories
Environmental Impact Statements
Instrument Development
Permitting Strategy
Pollution Control Design
Process Control Design
Process Engineering
Programming
Regulatory Compliance
Risk Assessment
Risk Management
SARA Documentation
Stack Testing

BIOLOGICAL SCIENCES
316(a) and (b) Demonstrations
Aerial Surveys
Biological Assessments
Biological Field Studies
Biological Modeling
Terrestrial and Aquatic Systems
Botanical Inventories
Community Survey
Compliance Monitoring

Dredging and Material Disposal
Environmental Assessments
Environmental Chemistry
Environmental Engineering
Environmental Geology
Environmental Impact Statement
Environmental Monitoring
Environmental Permitting
Environmental Risk Cost/Benefits
Erosion Control
Field Sampling
Geologic Hazard Evaluations
Geological Mapping
Groundwater Sampling
Hydrology
Landscape Ecology
Mitigation Design
Mitigation Plans
Natural Resource Damage Assessment
NEPA
NEPA Assessments
NPDES Permitting
Project Management
Quantitative Analysis
Resource Planning
Risk Assessment Modeling
Sediment Control
Sediment Transport
Slope Stability
Soil Survey
Soil/Sediment Quality
Soils
Surface Water Sampling
Threatened and Endangered Species Assessments
Threatened and Endangered Species Surveys

CHEMICAL SCIENCES
Air Sampling
Chemical Quality Management Plan
Data Management Plan
Deputy Project Manager
Drum Compatibility Testing
Drum Sampling
Engineering Evaluation/Cost Assessment
Fate and Transport Modeling
Feasibility Study
Field QA Audit
Field Sampling and Analysis Plan
Geotechnical Sampling
Groundwater/Surface Water Sampling
Infrared
National Pollution Discharge Elimination System
Organics
Preliminary Assessment/Site Investigation
Quality Assurance
RCRA Compliance Audit
RCRA Facility Investigation/RCRA Facility Audit
Remedial Action
Remedial Investigation
Remedial Investigation/Feasibility Study
Resource Conservation Recovery Act
Site Characterization
Site Closure Plan
Soil/Sediment Sampling
TANKS Sampling
Task Leader
Transformer Sampling
Volatile Headspace Analysis
Waste Characterization
Wipe Sampling

GEOSCIENCE
Borings and Wells - Geotechnical Borings
Borings and Wells - Monitoring Well Installation
Borings and Wells Recovery Well / Production Well Installation
Borings and Wells - Soil Classification / Logging
Exploration - Mine Tailings Piles
Exploration - Mineralogy
Exploration - Petroleum / Gas Fields
Hydraulics / Design - Dewatering
Hydraulics / Design - Extraction Well Design
Hydraulics / Design - Injection Well Design
Hydraulics / Design - Interceptor Trenches / French Drains
Hydraulics / Design - Product Recovery Well Design
Hydraulics / Design - Slurry Walls / Cut Off Trenches
Hydraulics/ Design - Extraction Well Design
Hydraulics/ Design - Injection Well Design
In Situ Remediation - Air Sparging
In Situ Remediation Bioremediation
In Situ Remediation - Soil Vapor Extraction
Manufactured Gas Plants - Coal Gas Sites
RCRA / CERCLA
Sampling - EPA / CLP Paperwork

Sampling - Groundwater
Sampling - Sediment
Sampling - Soil
Sampling - Water Level Measurements
Underground Storage Tanks / Refineries

HEALTH PHYSICS
Decontamination & Decommissioning Operations
Decontamination & Decommissioning Planning
High Level Radioactive Waste
Low Level Radioactive Waste
Shipping/Transportation of Radioactive Materials

HEALTH RISK
Environmental Assessments
Environmental Impact Studies
Evaluation of Remedial Alternatives
Fate & Transport Modeling - Air (In & Outdoor)
RCRA
Risk Communication
Sampling & Analysis Planning

REGULATORY AFFAIRS
Above-Ground Storage Act
Air Operating Permits
Air Permitting
Asbestos
Base Realignment and Closure Requirements
CERCLA
CERCLA Remedial Investigation
Coastal Zone Regs.
Compliance Audits
Debris
DOE Orders
DOT
DOT Hazardous Materials
DOT/Transporter regs.
Dredge & Fill Permits
Emergency Planning
Environmental Assessment
Environmental Assessments for Property Transactions (Phase I & II)
Environmental Audits
Environmental Compliance Audits
Environmental Impact Statement
Environmental Site Assessments
Environmental Training
EPA Common Sense Initiations
Hazardous & Solid Waste Mgmt
Hazardous Waste Management
Inspections/Audits
Installation Restoration Program
ISO 14000
LDRs
Licensing
Medical/ Infectious Waste
Mixed Waste
MTCA
NCP
NEPA
NESHAPs
NPDES
NPDES Stormwater permitting & Facility Compliance Inspections
OSHA PSM
PCBs
Permitting (Air, Water & Hazardous Waste)
Petroleum Contaminated Sites
Phase I ASTM
Phase II
Pollution Prevention
Pre-Acquisition Audits
Radioactive Waste
RCRA
RCRA Closure
RCRA Corrective Action
RCRA Facility Investigation
RCRA Generator Requirements
RCRA Hazardous Waste Mgmt
RCRA LDRs
RCRA Permitting
RCRA TSDF regs.
RCRA Waste Characterization
Recycling
Release Reporting-CERCLA/RCRA
Remediation
RFAs
RFIs
Risk Engineering & Environmental Site Assessments
Safe Drinking Water Act
SARA Title III
SARA
Solid Waste
Solid/Hazardous/Radioactive Waste Designations
Settlement Negotiations
Stormwater
Stormwater Permitting
SPCC Plans

Superfund
Transporter regs.
Treatability studies
TSCA Import/ Export
TSCA/PCB disposal
Technical Support to Regulatory Development
Used Oil
UST Closure
TSCA
UST Remedial Monitoring
UST Removal & Closure
Waste Characterization
Waste Minimization
UST Corrective Action
Wetlands
USTs
Waste Transportation & Disposal

SOCIAL SCIENCE
Community Relations
Cultural Resources
Economic Feasibility
Economics
Finance
Planning
Recreation

OTHER
Low-Level Radioactive Waste Disposal Facility Siting

TECHNICAL EXPERTISE

Various in the civil and mechanical engineering industries, including: drafting, cost accounting, grade setting, excavating and site grading, shoring, environmental, bio-venting, water treatment plants, hazardous transport, agency approvals, writing work plans, project management of underground projects, computer estimating, blueprint knowledge, heavy equipment operator, demolition, remediation and bio-remediation, vapor extraction, tank removal, disposal, sampling, assessments, health and safety plans, permitting, and structural and non-structural concrete**.**

LANGUAGE SKILLS

Spanish Knowledge Level: Secondary: Familiar

PROFESSIONAL REFERENCES

Kern Environmental Service
Frank Rosenlieb
P.O. Box 5337, Bakersfield, CA 93388
1-800-332-5376

Holguin, Fahan and Associates
Lisa Hancock--Title:-
Ventura, CA
805-652-0219

Brown and Bryant Superfund EPA
Kennedy/Jenks Consultants
James Curtis--Title:-
3336 Bradshaw Road, Suite 140, Sacramento, CA 95827

EXPERIENCE SUMMARY

Mr. Snow has over 30 years of construction/Remediation experience, including significant supervisory experience in soil Remediation projects on a wide range of CERCLA, RCRA, and other Hazardous Waste projects. He has the cross training and experience necessary to perform both Site Supervisor and Health & Safety Officer duties. He has extensive experience supervising and providing technical and field support through all phases of these projects, including client and regulatory agency interface, project scoping, Work Plan and Health & Safety Plan development, preparation and evaluation of contract bid specifications, procurement of materials and equipment, supervision of field crews, supervision of quality control technicians, planning, scheduling, documentation of the field work pursuant to Technical and Construction Bid Specifications, and project technical and financial reporting. He has supervised heavy equipment, material handling and earth moving operations, and transportation and disposal of hazardous and non-hazardous waste streams. In addition to his experience on multiple excavation, remediation, and demolition projects, Mr. Snow's experience includes waterway dredging excavation, construction and installation of erosion control measures, installation of HDPE liners, PVC liners, Hypalon liners, and XR-5 liners along with installation of supplementary components such as GCL liners geotextiles and composites in conjunction with liner systems, and oversight of multidisciplinary field teams, subcontractors, and craft personnel.

EDUCATION

BS, Civil Engineering, Conestoga College of Applied Arts and Tech, 1973

TRAINING

40-Hour OSHA Hazardous Waste Health & Safety Training
8-Hour OSHA Hazardous Waste Health and Safety Refresher
Confined Space Entry
Loss Control Training Program
Environmental and Safety Supervisor Course
OSHA Supervisor Training
Waste Management Employee Training Program, 40 CFR 265.16
DOT Employee Training Program, DOT/HM-126F Hazmat Training 49 CFR 172, Subpart H
OSHA Construction Safety and Health Training
Hard Dollar Level 1 Certification
Hard Dollar Level 2 Certification
Procurement Training & Certification of Authority
PM 200 Training
PM 300 Training
USACE Construction Quality Management for Contractors and RMS for Contractors
Virginia Class A Contractor

CORPORATION PROJECT EXPERIENCE

Project Manager
RMC Troutdale Smelting Plant Additional work
Troutdale Oregon
Project Manager for $3,000,000.00 in additional work for Alcoa at the Troutdale Oregon site. The work consists of construction of a Focused Extraction/Production Well Optimization System, installation of a new watermain, modification of building 70, and additional soil and rock removal and disposal. All work is being self performed by Tetra Tech EC, Inc.

Project Manager
Fairmead Landfill Expansion
Madera County California
Project manager for the construction of a new landfill cell and leachate collection system.

Project Manager
RMC Troutdale Aluminum Smelting Plant Demolition and Remediation
Troutdale Oregon
Project Manager for the Demolition of an Aluminum Smelting Plant and for the site remediation. The project consists of the clean out and abatement of 25 acres of buildings and the associated underground utilities, salvage of process materials (Alumina, Bath, Flouride, and Coke products), recycling of scrap metal both ferrous and non-ferrous, recycling of wood products, and recycling of salvaged oil products. In addition the project involves the remediation of the plant site to clean up goals and restoration of the plant site for future sale. The project has a duration of 24 months and is valued at $20,000,000.

Project Manager
South Landfill Remediation
Alcoa Troutdale Facility, Troutdale, OR
Project Manager for the purging and demolition of 900 lf of natural gas pipeline and the remediation of the South Landfill including the excavation, loading, and transportation of 65,000 tons of contaminated soil. Also included in the landfill remediation was grading, construction of a new concrete entrance, and construction of 2,100 lf of gravel roads.

TERC Contract No. DACW45-94-D-003 Delivery Orders 31 and 34
Kirtland Air Force Base, Albuquerque, New Mexico
Construction Manager for the closure of several landfills on Kirtland Air Force Base in Albuquerque, NM. The closure actions for these landfills include removal actions at several landfills and construction of Evapotranspiration (ET) Soil covers at the remaining landfills.

Former Industrial Landfill Closure, Parkersburg, WV
Project Manager on a design/build contract for the Parkersburg Landfill Closure, located in Parkersburg, West Virginia.
The Parkersburg Landfill Closure is a voluntary clean up and closure for a confidential client. The major items of work include the solidification of 26,000 CY of tar like material and debris contaminated with the tar, construction of a landfill cap, a storm water collection and outlet system, a new site entrance, construction of a 10,500 SF concrete pad, placement of cover soil and topsoil, and hydro seeding to establish vegetation. The project involved a high degree of quality control monitoring and documentation to verify that all the tar like material and debris contaminated with tar was solidified and met the requirements of the plans and specifications, and the requirements of the State of West Virginia Department of Environmental Protection. Even though several changed conditions were encountered during construction, value engineering and alternative construction techniques employed by Tetra Tech FW, Inc. resulted in the project being completed 5 weeks ahead of schedule and 35% below budget.

Ward Cove Sediment Remediation, Ketchikan, Alaska
Project Manager on the Ward Cove Sediment Remediation Project, located in Ketchikan, Alaska.
The Ward Cove Sediment Remediation Project is a Superfund Site. The major items of work are construction of a de-watering and consolidation facility for dredge spoils, log removal, dredging of organic material, dredging of approximately 150 CY of lightly PAH contaminated soil, placement of a thin sand cap, hydrographic surveys, water quality monitoring and verification sampling of the thin cap areas once the sand is placed.

Rocky Flats Environmental Technology Site, Golden, CO
Associate Project Manager, Office & Warehouse Manager and Environmental Safety Supervisor.
Task orders at Rocky Flats included strip out and Demolition of buildings, Security System Projects, Breathing Air Systems installation and various other construction and demolition projects. Other duties included procurement, some cost control and scheduling with Primavera software.

Smith's Farm Operable Unit 2 Remedial Action, Louisville, KY
Project Manager for the construction of a 34-acre RCRA landfill cap consisting of geosynthetic clay liner, 40 Mil LLDPE textured liner, and drainage geocomposite. Duties include procurement of materials and equipment; supervision of welding technicians; supervision of quality control technicians; and planning, scheduling, and documentation of the installation pursuant to the technical specifications and quality control manual.

As Project Manager I was responsible for all aspects of the project including completion of Earthwork, the start up, testing and operation of a Leachate Treatment Facility, establishing vegetation, Project Demobilization and Closeout. Other duties included scheduling, procurement and cost control.

Savannah River Site Low Level Radioactive Waste (LLRW Closure Project, Aiken, SC
Senior Geotechnical Advisor for a 35-acre closure consisting of geosynthetic clay liner, 40 Mil textured LLDPE liner, drainage composite, gas vent geotextile, and geogrid soils reinforcement. Duties include the review of technical specifications; monitoring and updating of the quality control program for the geosynthetic systems, assisting quality control personnel, assigning installation personnel, advising the site personnel in handling issues that arise in regard to the geosynthetic systems, assisting quality control personnel, assigning installation personnel, advising the site personnel in handling issues that arise in regard to the geosynthetic procedures; and attending site meetings as an in-house consultant to assist site personnel in clarifying and resolving all geosynthetic issues that arise during the project.

Three Rivers Regional Landfill, Cell 1 Construction, Aiken, SC
Liner Systems Project Manager for the construction of a new 16-acre Subtitle-D landfill cell consisting of 60 Mil HDPE textured and smooth liner and drainage geocomposite. Duties include procurement of materials and equipment; supervision of quality control technicians; supervision of welding technicians; planning, scheduling, and review of technical specifications; implementation of quality control program, and documentation of the installation pursuant to the technical specifications and quality control manual.

Landsaver Environmental, Richmond, VA
General Manager responsible for the overall management of the Geosynthetic liner division with respect to technical specifications, contractual requirements, quality, financial goals, reviewing and approving expenses, direct billings, and assisting with collections. Duties included review of technical specifications, implementation monitoring and updating of the Geosynthetic Liner Quality Control Program, estimating installation costs, procurement of equipment and materials, supervision of welding technicians and field supervisors, supervision of quality control personnel, planning, scheduling, budgeting, training, documentation of the installations pursuant to the Technical Specifications and Quality Control Manual, contract review, and cost control of the projects and the Division.

Projects included a 100-acre wastewater treatment facility for Hughes Aircraft plant #44 in Tuscon, AZ, which consisted of 8,712,000 square feet of 100 Mil HDPE and 4,356,000 square feet of Geonet. A 100 acre landfill closure for The Army Corps of Engineers located in Ft. Eustis, VA and consisting of 4,356,000 square feet of 40 Mil LLDEP, 4,356,000 square feet of Geonet and 4,356,000 square feet of Geotextile. Construction of Phases 1&2 of a new municipal landfill for Atlantic Waste Disposal in Waverly, VA, consisting of 6,577,560 square feet of 60 Mil HDPE (smooth and textured), 3,288,780

square feet of Geosynthetic Clay Liner (GCL), 6,577,560 square feet of Geocomposite, and 9,866,340 square feet of Non-Woven Geotextile.

Geosynthetics, Inc.
Established a geomembrane fabrication facility for PVC liner including the hiring and training of production and quality control personnel while performing my regular duties as Construction Manager. Managed both construction and fabrication until the hiring of a Plant Manager in early 1989. After this time, concentrated on construction including estimating, scheduling projects and field personnel, annual budgeting, and assisting actively in marketing and sales of our geomembranes and other geosynthetics.

Project Manager/Installation Superintendent
National Seal Company, Galesburg, IL
I began my employment as an installation superintendent and installed several million square feet of geomembranes in hazardous waste sites, sanitary landfills, waste water treatment plants, etc. before being promoted to Project Manager in March 1987. As a project Manager, my duties included scheduling of field crews, monitoring of construction costs, estimating projects, assisting actively in the marketing and sales of geomembranes and associated geosynthetic products.

Installation Superintendent
Gundle Lining Systems, Houston, TX
Employed as an Installation Superintendent and installed 35 million square feet of high-density polyethylene throughout North America. Duties included scheduling, hiring and terminating employees, cost control, project safety, quality control supervision and assisting with estimating.

Senior Project Manager
Phillips Engineering, Inc.
I was employed as a Senior Project Manager in charge of inspection, documentation, and testing on various construction projects. The projects ranged in size from $100,000.00 to $35,000,000.00 and included earthwork projects, highway bridges and the replacement of sanitary sewers, storm sewers, watermains and roadways for a city of 25,000.

Construction Superintendent
Steed and Evans Ltd.
Responsible for two asphalt crews, three concrete crews, two Sewer crews, and two grade crews. Duties included scheduling, estimating assistance, and cost control.

Project Manager
Proctor and Redfern
In charge of inspection on various construction projects. The projects were varied and consisted of earthwork construction, waste water treatment, highway construction including bridges and Urban Renewal projects in the downtown core of a city of 300,000 people.

PREVIOUS EXPERIENCE

General Manager, June 1991 - March 1997
Landsaver Environmental, Richmond, VA
Responsible for the overall management of the Geosynthetic liner division with respect to technical specifications, contractual requirements, quality, financial goals, reviewing and approving expenses, direct billings, and assisting with collections. Duties included review of technical specifications, implementation monitoring and updating of the Geosynthetic Liner Quality Control Program, estimating installation costs, procurement of equipment and materials, supervision of welding technicians and field supervisors, supervision of quality control personnel, planning, scheduling, budgeting, training,

documentation of the installations pursuant to the Technical Specifications and Quality Control Manual, contract review, and cost control of the projects and the Division.

Projects included a 100-acre wastewater treatment facility for Hughes Aircraft plant #44 in Tuscon, AZ, which consisted of 8,712,000 square feet of 100 Mil HDPE and 4,356,000 square feet of Geonet. A 100 acre landfill closure for The Army Corps of Engineers located in Ft. Eustis, VA and consisting of 4,356,000 square feet of 40 Mil LLDEP, 4,356,000 square feet of Geonet and 4,356,000 square feet of Geotextile. Construction of Phases 1&2 of a new municipal landfill for Atlantic Waste Disposal in Waverly, VA, consisting of 6,577,560 square feet of 60 Mil HDPE (smooth and textured), 3,288,780 square feet of Geosynthetic Clay Liner (GCL), 6,577,560 square feet of Geocomposite, and 9,866,340 square feet of Non-Woven Geotextile.

Construction Manager, 1988-May 1991
Geosynthetics, Inc.
Established a geomembrane fabrication facility for PVC liner including the hiring and training of production and quality control personnel while performing my regular duties as Construction Manager. Managed both construction and fabrication until the hiring of a Plant Manager in early 1989. After this time, concentrated on construction including estimating, scheduling projects and field personnel, annual budgeting, and assisting actively in marketing and sales of our geomembranes and other geosynthetics.

Project Manager/Installation Superintendent, 1984 - September 1988
National Seal Company, Galesburg, IL
I began my employment as an installation superintendent and installed several million square feet of geomembranes in hazardous waste sites, sanitary landfills, waste water treatment plants, etc. before being promoted to Project Manager in March 1987. As a project Manager, my duties included scheduling of field crews, monitoring of construction costs, estimating projects, assisting actively in the marketing and sales of geomembranes and associated geosynthetic products.

Installation Superintendent, 1980-1984
Gundle Lining Systems, Houston, TX
Employed as an Installation Superintendent and installed 35 million square feet of high-density polyethylene throughout North America. Duties included scheduling, hiring and terminating employees, cost control, project safety, quality control supervision and assisting with estimating.

Senior Project Manager, 1978-1980
Phillips Engineering, Inc.
I was employed as a Senior Project Manager in charge of inspection, documentation, and testing on various construction projects. The projects ranged in size from $100,000.00 to $35,000,000.00 and included earthwork projects, highway bridges and the replacement of sanitary sewers, storm sewers, watermains and roadways for a city of 25,000.

Construction Superintendent, 1975-1977
Steed and Evans Ltd.
Responsible for two asphalt crews, three concrete crews, two Sewer crews, and two grade crews. Duties included scheduling, estimating assistance, and cost control.

Project Manager, 1973-1975
Proctor and Redfern
In charge of inspection on various construction projects. The projects were varied and consisted of earthwork construction, waste water treatment, highway construction including bridges and Urban Renewal projects in the downtown core of a city of 300,000 people.

DISCIPLINE CODES

Production Experts: 118, Y

EXPERIENCE SUMMARY

More than 38 years of professional experience in program and project management, technical oversight, and geotechnical engineering projects related to investigation and design of solid and hazardous waste disposal sites, tailings disposal facilities, slope stability, foundations, dams, and non-impounding mine waste embankments. Project Manager on a variety of hazardous and nonhazardous waste projects for both federal and commercial clients. Extensive experience in remedial investigations, feasibility studies, remedial design, and site remediation for hazardous waste sites; and with the implementation and construction of remedial measures, including groundwater barriers, pump and treat systems, landfill covers, soil flushing, and solidification. Performed geotechnical engineering evaluations for wind turbine generator sites. Served as an expert witness and has spoken on behalf of clients at many public hearings and meetings.

EDUCATION

MS, Geotechnical Engineering, Purdue University, 1969
EM (Engineer of Mines), Mining Engineering, Colorado School of Mines, 1967

REGISTRATIONS/CERTIFICATIONS

Professional Engineer, CO, Number 10703, Earned 9/18/71, Expires 5/31/07
Professional Engineer, Mining, AZ, Number 14308, Earned 4/12/81, Expires 9/30/07
Professional Engineer, UT, Number 1615342202, Earned 5/6/81, Expires 12/31/06
Professional Engineer, Mining, WY, Number 2245, Earned 10/1/76, Expires 12/31/07
Professional Engineer, Mining, WA, Number 27599, Earned 2/15/91, Expires 5/22/07
Professional Engineer, SD, Number 3700, Expires 12/31/06
Professional Engineer, Mining, NV, Number 6054, Earned 3/5/82, Expires 6/30/06
Professional Engineer, NM, Number 7352, Earned 5/2/80, Expires 12/31/06
Professional Engineer, Mining, ID, Number 7608, Earned 6/17/94, Expires 5/31/07
Professional Engineer, MT, Number 9002PE, Earned 7/10/86, Expires 6/30/08
Professional Engineer, Civil, AK, Number 9211, Earned 11/20/75, Expires 12/31/07
Professional Engineer, KS, Number 9541, Earned 5/23/83, Expires 4/30/07
Professional Engineer, ND, Number PE-2301, Earned 7/3/80, Expires 12/31/06

TRAINING

40-Hour OSHA Hazwoper, EBASCO, July 14, 1988
8 Hour Supervisor's Training, Emilicott Associates, Inc., April 11, 1989
OSHA 10 Hour Construction Safety & Health, Tetra Tech EC, Inc., February 1, 2000
Loss Control Self Study Course, Tetra Tech EC, Inc., April 1995
DOT Hazmat Training, Tetra Tech EC, Inc., August, 2006
First Aid/Basic CPR, Lifeline, January 2006
8 Hour Refresher Training, Tetra Tech EC, Inc., July 2006

CORPORATION PROJECT EXPERIENCE

Senior Geotechnical Engineer 2006
UPC Oregon Wind, LLC, Cascade Wind Project, OR
Geotechnical engineering oversight for siting application related to geology and seismicity of proposed site near Ortley, OR. Siting and design constraints include seismic potential, volcanic activity such as ash falls during eruption, landslide potential and rockfall potential.

Senior Geotechnical Engineer 2006
Kodiak Electric Association, Pillar Mountain Wind Project, Kodiak, AK
Engineering lead for civil/geotechnical feasibility assessment for proposed WTG site on an 1800 foot high hill adjacent to Kodiak, AK. Major considerations were transportation into Kodiak Island and to the top of the mountain; foundation design in extremely high seismic risk region; site stability relative to existing major landslide; and selection of appropriate WTG equipment for the wind regime and seismic loading potential of the site.

Senior Geotechnical Engineer 2006 - Present
Ridgeline Corporation, Goshen Wind Project, Idaho Falls, ID
Geotechnical engineering lead for all geotechnical investigations and design for foundations for 60 proposed WTG foundations and related infrastructure. Site is located in high seismic risk zone and appropriate design measures are being incorporated into foundation design and structural components.

Project Manager/Geotechnical Engineer 2005 – Present
Marathon Oil Company, Powder River Basin CBM Water Management, Gillette, WY
Project manager and project geotechnical engineer for developing water management alternatives for produced water management. The water is produced as a by-product of coal bed methane production from relatively shallow coal seams in the Powder River Basin, WY. Work consists of siting, groundwater and geotechnical investigations, design and permitting of numerous off-channel impoundments and on-channel reservoirs that will be used to store and infiltrate produced water. Other water management alterntives include irrigation, shallow well injection and treatment.

Program Manager, 2003 – 2005
Denver Federal Center, Federal Highway Administration (FHWA), Lakewood, CO
Program manager for this multi year ID/IQ contract that is directed towards management, clean up and site closure for TCA contamination resulting from a former leaking UST at the Denver Federal Center (DFC). Task orders to date range from site investigations, sampling, design and construction of the IM#2 treatment system to remove TCA and other chlorinated solvents from the shallow and deep groundwater near the original spill site, evaluation of monitored natural attenuation as the long term remedy, preparation of site cleanup schedule, publication of a semi-annual newsletter for the community, bench scale treatablility studies, and preparation of the Corrective Measures Work Plan.

Program Manager/Project Engineer, 2003 – Present
U.S. Army Corps of Engineers, Omaha District, Southwest TERC, Denver, CO
This ten-year, $150 million CPAF TERC contract involves cradle-to-grave delivery orders at several USAF bases in the southwest. Responsible for all construction work related to the closure of five landfills at Kirtland AFB, Albuquerque, NM. These projects range from removal actions to in place closures that include the installation of state-of-art evapotranspiration (ET) covers at three existing landfills that cover a total of approximately 200 acres. Activities include the preparation of all pre-design, design and planning documents, supporting the Base through the public hearing/resolution process, actual construction, revegetation and long term maintenance.

Project Manager, 1998 – 2003
Rocky Mountain Arsenal, Program Management Contract, Commerce City, CO
Project manager for multiple task orders at Rocky Mountain National Wildlife Refuge/Arsenal, CO. The task orders included site restoration using soil excavation, innovative insitu thermal destruction, stabilization/solidification; design of site restoration; groundwater and surface water management; and wildlife habitat restoration including revegetation, irrigation, weed control and soil augmentation. Projects included the first treatment of comtaminated soils at RMA at the M-1 Pits site where cement soil

stabilization using a pugmill was employed; revegetation and irrigation of more than 3000 acres; and initiation of the only innovative technology to be used at RMA - insitu thermal destruction using 276 heater wells on six foot centers to thermally treat hexachlorocyclopentadiene and other pesticide byproducts in a site known as the HEX Pit. All his projects were completed on time and within budget and without a single recordable or lost time accident. Mr. Versaw received recognition through the cost improvement program for innovations that resulted in several millions dollars of cost savings.

Rocky Mountain Arsenal, Hazardous Waste Landfill
Ron was involved in evaluating the compatibility of a unique waste stream with the clay liner, geomembrane liner, leachate collection and treatment systems for the Hazardous Waste Landfill; at RMA. The material in question was a highly chlorinated intermediate compound manufactured by Shell Chemical Corporation (Hexachlorocyclopentadiene) in the manufacturing of pesticides. This material was intended to be treated with an in situ thermal process and, therefore, was not included among the materials originally evaluated for compatibility with, during the design of the Hazardous Waste Landfill. Ron and his PMC team of 12 scientists and engineers were able to make this demonstration based on the results of analytical tests of the leachate produced by this material. The regulatory agencies that accepted these analyses for compatibility included EPA, CDPHE Colorado Department of Public Health and the Environment, and Tri-County Health Department.

Deputy Program Manager and Delivery Order Manager, 1995 - 1998
U.S. Army Corps of Engineers, Omaha District, Southwest TERC, Denver, CO
. Responsible for managing all activities at Holloman AFB, New Mexico, where several innovative technologies are being implemented to address POL and solvent contamination. Seven delivery orders totaling more than $15 million are active at Holloman AFB. Work ranges from PA/SIs to remedial action. Remedial designs or remedial actions are underway for two RCRA caps, more than 30 O/WS removals and/or POL contamination sites, two dual-phase high-vacuum extraction and thermal treatment systems, a SVE/thermal treatment systems 11 biovent or biovent/SVE systems, and an air sparging/SVE system. All work at Holloman AFB is being completed under the USAF Air combat Command's Accelerated Cleanup Program (ACP). The base estimates that the ACP, as implemented through the TERC, is completing the work in one-half the normal time at 50% of the cost.

Senior Geotechnical Engineer, 1994 - Present
U.S. Navy, EFA Northwest RAC, Silverdale, WA
Currently serves as a senior geotechnical engineer on Alaska HTRW projects including design of a groundwater collection, containment, and treatment system for POL contamination at the remote former Naval Arctic Research Laboratory, Point Barrow; POL contamination cleanup activities associated with current and past naval operations at the air facility, Adak Island; and for a landfill cap at a 20-acre site in Whidbey Island, Washington.

Program Manager, 1993 - 1997
Hill AFB, UT
Work to date includes conducting field investigations, analytical and geotechnical testing and preparing a summary report for contamination studies at 29 former UST sites at UTTR, risk assessments, environmental baseline surveys, and updating of range management plans for UTTR.

Program Manager, 1993 - 1994
U.S. Army Corps of Engineers, Tulsa District, HTRW A/E Services, Various Sites Within the District
Managed this $4.5 million HTRW A/E services contract. On a delivery-order basis, directs hazardous waste and environmental studies at DoD, DOE, and Army installations under the Installation Restoration Program (IRP). The scope of work for the contract included work performed under CERCLA (RI/FS,

RD), RCRA (RFA, RFI) and NEPA (environmental assessments). Responsible for preparing a USACE Guide Specification for the soil washing technology. Provided value to USACE by compressing project schedules while maintaining very high technical performance standards.

Program Manager, 1991 - 1994
U.S. Army Corps of Engineers, Huntsville District, HTRW A/E Services, Nationwide Sites Managed tasks that included a $1.4 million delivery order for an addendum to the Human Health Endangerment Assessment at Rocky Mountain Arsenal (RMA), Denver, Colorado. This was a comprehensive study of the potential exposure risks to workers, recreation visitors, and other groups to hazardous compounds in the soil and groundwater. Also managed other tasks including the investigation and evaluation of petroleum hydrocarbon and other toxic contamination at the Defense Fuel Supply Point in Mukilteo, Washington.

Project Geotechnical Engineer, 1991
U.S. Department of Energy, Macro-Engineering Study, Hanford Site Environmental Restoration, Hanford, WA
Evaluated waste management technologies that will save billions of dollars in remediation costs. Conducted a feasibility study to determine the applicability of using large-scale mining-type excavation and materials handling technologies for handling low-level radioactive contamination. Special materials processing schemes were evaluated along with large-scale burial cells.

Geotechnical Engineering Lead, 1989 - 1991
Rocky Mountain Arsenal, Program Manager's Office, Commerce City, CO
Evaluated and screened more than 100 remedial technologies for groundwater collection, treatment, and reinjection to eliminate those that were not applicable, cost effective, or implementable for the groundwater portion of the FS. Made numerous presentations to and negotiated with state and federal agencies that are involved in activities at RMA.

Project Engineer, 1988 - 1989
Rocky Mountain Arsenal, Basin F Interim Remedial Action, Commerce City, CO
This $36 million project involved handling several million gallons of highly toxic liquid waste, solidification of several hundred thousand cubic yards of sludges and contaminated soils, construction of three double HDPE-lined ponds, and a RCRA-like landfill for the solid wastes. Controlled all field engineering in support of construction, prepared all submittals required by the Corps, design field modifications, and supervised construction quality control activities.

PREVIOUS EXPERIENCE

Principal Geotechnical Engineer/Environmental Program Manager, 1987 - 1988
Stone & Webster Engineering Corporation, Denver, CO
Lead Geotechnical Engineer on several waste and civil engineering projects. Responsible for waste disposal tasks for a waste-to-energy feasibility study for the City and County of Denver and Public Service Company of Colorado, which included evaluation of viability of continued landfilling at existing or new sites and availability, design, cost, and permitting associated with MSW combustion ash disposal. Responsible for design studies for railroad spurs in south Texas, a geothermal plant access road at the Geysers area in California, transmission lines for the Bradley Lake hydroelectric facility in Alaska, and foundation and waste water pond design for a coal conversion plant in Montana. Chaired a session on "Remediation Technologies for the Mining Industry" at the 91st National Western Mining Conference Short Course, in Denver, Colorado in February 1988.

Associate/Project Manager, 1978 - 1987
Golder Associates, Denver, CO
Responsible for all investigation, design, and construction activities related to the Lowry Landfill National Priority List site and the now closed Denver-Arapahoe Chemical Waste Processing Facility (DACWPF). Duties as Project Manager at this site included extensive hydrogeological investigations and modeling; design and installation of a perched groundwater interceptor drain; certification of clean closure of a former RCRA burial cell; design and construction of all decontamination, storage, and treatment facilities for closure; and design of the final RCRA cell for burial of all wastes from the exhumed RCRA landfill. Both the Lowry Landfill and DACWPF projects involved negotiations with state and USEPA Region VIII regulatory agencies that led to the completion of permits, presentations at public hearings and meetings, and expert testimony in support of litigation. Responsible for marketing, staffing, project management, and client relations for geotechnical projects relating to hazardous waste, solid waste, tailings disposal, dams, mine waste, and foundations. Typical hazardous waste projects included RI/FS investigations, design, expert testimony, and construction of a groundwater barrier at Lowry Landfill, Arapahoe County, Colorado; investigations, design and permitting of RCRA burial cell, design and construction of various closure activities at the Denver-Arapahoe Chemical Waste Processing Facility, Arapahoe County, Colorado; RI/FS investigations and design of remedial action at abandoned National Priority List refinery waste disposal sites in Salt Lake City, Utah and Neodesha, Kansas; and RI/FS investigations, design, and partial remediation of a industrial facility for Xerox Corporation in Oak Brook, Illinois. Responsible for investigations, preliminary design, and public hearings for proposed sanitary landfills in Douglas and Jefferson Counties, Colorado, and Phoenix, Arizona. Tailings disposal projects include geotechnic, hydrologic, and design studies to support the EIS for remediation of the uranium tailings piles at Grand Junction and Rifle; decommissioning for TVA uranium mill and tailing piles at Edgemont, South Dakota; design and permitting of HDPE-lined uranium tailings disposal facility at Ford, Washington, and gold cyanide tailing disposal facility near Eureka, Nevada; preliminary design and evaluation of potential environmental impacts from disposal of wastes from processing of deep ocean manganese nodules at sites along the Gulf Coast, West Coast, and Hawaii. Responsible for design of rehabilitation measures for Victor Dam on Pikes Peak, Colorado; design of waste stockpiles for marble quarry in western Massachusetts; stability analyses of soils and highwalls at coal mine near Oak Creek, Colorado; and characterization of processed oil shale and stability analyses of oil shale waste piles up to 2,000 feet high for the Rio Blanco Oil Shale project.

Assistant to Senior Engineer, 1968 - 1978
Dames & Moore, Denver, CO
Managed and provided geotechnical engineering services for typical projects including foundations for industrial facilities, design of tailings disposal facilities, slope stability for surface mines, and landslide evaluations.

Teaching Assistant, 1967 - 1968
Purdue University, Lafayette, IN
Responsible for setting up a rock mechanics test laboratory.

PUBLICATIONS & PRESENTATIONS

Versaw, R., Alternative Evapotranspiration Landfill Covers – Cost-Effective Landfill Closure at Kirtland AFB, NM. Presented at and included in the proceeding of the AFCEE Technology Transfer Workshop, San Antonio, TX, August 16-19, 2004.

Versaw, R., R. Thomas, and B. Peterson. 2003. Restoration/Mitigation of More Than 8,000 Acres at Rocky Mountain Arsenal. Presented at and included in the proceedings of the 29th Environmental and Energy Symposium & Exhibition. National Defense Industrial Association, Richmond, VA, April 2003.

Also presented at and included in the proceedings of the National Education and Training Conference, Society of American Military Engineers, Seattle, WA, May 2003.

Lytle, R., R. Versaw, and M. Fitzgerald. 1992. Material Handling and Incineration of Oily Waste at the BROS Superfund site-Gloucester County, New Jersey. Presented at Budapest '92, International Symposium on Environmental Contamination in Central and Eastern Europe, October 1992.

Gabel, D. and R.E. Versaw. 1991. Interim Response Action at the Rocky Mountain Arsenal. The Military Engineer, July 1991, Volume 83, No. 543.

Versaw, R.E. and J. Lowrey. 1990. Case History, Hazardous Waste Containment at the Basin F Interim Remedial Action, Rocky Mountain Arsenal. Watch Your Waste - Geotechnical Design In Waste Management Practice, Colorado Section of ASCE.

Gabel, D. and R.E. Versaw. 1990. Matching the Remedial Technology to the Hazardous Waste Site, a Case History - Basin F at Rocky Mountain Arsenal. Environmental Compliance - Solutions that Work. Northwest Mining Association and Colorado Mining Association.

Versaw, R.E., D.L. O'Sadnick, E.K. Demos, and R.J. Cohen. 1986. The Lowry Landfill Ground Water Dam. Haztech International, 1986.

Doty, B.P. and R.E. Versaw. 1984. Ground Water Conditions at the Grand Junction Uranium Mill Tailings Pile. Management of Uranium Mill Tailings, Low Level Waste and Hazardous Waste. Proceedings of the Sixth Symposium, Colorado State University.

Small, D., J. Thompson, and R.E. Versaw. 1981. Dawn Mining's Tailings Expansion Project, A Case Study in the Use of HDPE Lining. Uranium Mill Tailings Management. Proceedings of the Fourth Symposium, Colorado State University.

Versaw, R.E. 1978. Environmental Considerations in Mill Sitting. Mineral Processing Plant Design. Society of Mining Engineers of AIME.

Swaisgood J.R. and R.E. Versaw. 1977. Geotechnical Investigations for Mine Shafts, Subsurface Geology. Colorado School of Mines, Fourth Edition.

Toland G.C. and R.E. Versaw.1976. Design of Impoundment and Evaporation Ponds and Embankments for Cyanide and Other Toxic Effluents. Transactions of the Society of Mining Engineers, Volume 260, No. 1.

PROFESSIONAL AFFILIATIONS

The Society for American Military Engineers (SAME)
DOE Q Clearance, Inactive - 1997

DISCIPLINE CODES

16 Construction Manager, N
23 Environmental Engineer, Y
43 Mining Engineer, N

SKILL SET

Biological Sciences
Dredging and Material Disposal
Environmental Engineering
Environmental Geology
Environmental Impact Statement
Erosion Control
Geologic Hazard Evaluations
Site Selection
Siting Studies
Slope Stability
Chemical Sciences
Geotechnical Sampling
Groundwater/Surface Water Sampling
Remedial Action
Remedial Investigation
Remedial Investigation/Feasibility Study
Site Characterization
Geoscience
Borings and Wells - Geotechnical Borings
Borings and Wells - Monitoring Well Installation
Borings and Wells Recovery Well / Production Well Installation
Borings and Wells - Soil Classification / Logging
Dense Non Aqueous Phase Liquids (DNAPL)
Exploration - Mine Tailings Piles
Exploration - Mineralogy
Exploration - Mining
Hydraulics / Design - Dewatering
Hydraulics / Design - Extraction Well Design
Hydraulics / Design - Injection Well Design
Hydraulics / Design - Interceptor Trenches / French Drains
Hydraulics / Design - Product Recovery Well Design
Hydraulics / Design - Slurry Walls / Cut Off Trenches
Hydraulics/ Design - Extraction Well Design
Hydraulics/ Design - Injection Well Design
Hydrogeology - Flow Net Analysis
Hydrogeology - Slug Test Analysis
In Situ Remediation - Air Sparging
In Situ Remediation Bioremediation
In Situ Remediation - Soil Vapor Extraction
Light Non Aqueous Phase Liquids (LNAPL)
Sampling - Groundwater
Sampling - Sediment
Sampling - Soil
Sampling - Water Level Measurements

PROFESSIONAL REFERENCES

Mr. Jake Stroupe, Project Manager, Marathon Oil Company, WY 307-685-5080
Mr. Steve Rowe, Project Manager, US Army Corps of Engineers, Omaha, NE 406-221-7673
Mr. Charlie Scharmann, Program Manager, Remediation Venture Office, Rocky Mountain Arsenal, 303-289-0180

Attachment 2

Submittal Register

Attachment 2. Submittal Register

SUBMITTAL REGISTER					**Title and Location:** IRA-0, TO 0003, Kirtland AFB, NM						**Date:**			
					Contractor: Tetra Tech EC, Inc.					**Project Number:** MHMV 06-7073				
						Classfi-cation		**Contractor Schedule Dates**			**Contractor Action**		**Government Action**	
Activity No.	**Transmittal No.**	**Item. No.**	**Spec. Paragraph No.**	**Description of Submittal**	**Type of Submittal**	**FIO or GA**	**Contract or Review**	**Submit Needed By**	**Approval Needed By**	**Material Needed By**	**Code**	**Submit to Corps**	**Code**	**Date**
Earthwork														
		1		Subgrade Compaction Testing	Test Reports	FIO								
		2		Rip Rap	Sample of Rock	FIO								
Geosynthetic Liner														
		1		Trial Seam Testing Log	Test Reports	FIO								
		2		Tensile Property Verification Sheet for Liner	Test Reports	FIO								
		3		Geosynthetics Seam Testing	Test Reports	FIO								
		4		Repair Log	Test Reports	FIO								
		5		Receipt of Materials and Inspection Report	Test Reports	FIO								
		6		Panel Placement and Panel Seaming Report	Test Reports	FIO								
		7		Non-destructive Testing Report	Test Reports	FIO								
		8		Destructive Seam Testing Log	Test Reports	FIO								
		9		Trial Seam Testing Log	Test Reports	FIO								
Seeding														
		1		Materials-Seed	Certificates	FIO								
		2		Materials-Mulch	Certificates	FIO								
Post-Construction Activities														
		1		As-Built Survey	Survey Data	FIO								

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Attachment 3

Pre-Construction Permit Checklist

Attachment 3. Preconstruction Permit Checklist

No.	Item	Responsible Organization	Base or Other Contact	Check
1.	Read, understand and comply with all approved base wide and site specific plans and work plans	KAFB, Contractor	377 MSG/CEVR, Project Manager	
2.	Safety Plans—base wide and site specific—No actual approval is obtained on these, but they need to be checked as available	KAFB, Contractor	377 MSG/CEVR, Project Manager	
3.	Training per approved plans and work plans (Item 1)	KAFB, Contractor	377 MSG/CEVR, Project Manager	
4.	Surface Disturbance Soil Disturbance Permit	377 MSG/CEVC and City of Albuquerque Environmental Health	Pat Montana; 377 MSG/CEVC, 846-8577 Charlie Aragon; City of Albuquerque, 768-1930	
5.	Storm Water Pollution Prevention Plan Permit	377 MSG/CEVC U.S. EPA	Pat Montano; 377 MSG/CEVC 846-8577 Online Notice of Intent can be found at: http://cfpub.epa.gov/npdes/stormwater/enoi.cfm	
6.	Two-Way Radio Permits or Licenses	FCC	Kirtland Base Security, 846-7706	
7.	Section 404 Permit, Clean Water Act	U.S. Army COE	Pat Montano; 377 MSG/CEVC 846-8577	
8.	Hot Work Permit for Welding, etc.	KAFB Fire Department	KAFB Fire Dept. No. 9 Juan Salas; 377 MSG/CEF, Fire Chief 853-3639 377 ABW/SEG Kevin McDowell, 853-0269	
9.	Request for Environmental Impact Analysis (AF 813)	377 MGS/CEVQ	Dr. Evelyn Watkin; 846-4377	
10.	Dig Permit	Chugach Mgmt. Services New Mexico One Call	Marc Kocon (505) 846-9023 New Mexico One Call System, Inc.; 260-1990	
11.	Bioenvironmental Coordination for Radioactive Work	377 AMDS/SGPD	Capt. Murren, 846-3625	
12.	Wing Safety Coordination	377 ABW Safety	Wayne Ragan (505) 846-4226	
13.	Explosives Ordinance Disposal/UXO Safety		SMSgt Kent Gray (505) 846-2229	
14.	Spill Response and Reporting Coordination	377 MSG/CEVC	Robert Dray, 846-0007	
15.	CE Fire Department Notification	CE Fire Departmetn	Juan Salas; 377 MSG/CEF, Fire Chief, 853-3639 or Lillian Gonzales (505) 846-8305	
16.	Security Notification	Base Security	KUMMSC 846-1478 or 6944 Law Enforcement Desk 846-7926/7923	
17.	Natural Resource Protection	377 MSG/CEVQ	Carol Finley, 846-0053	
18.	Cultural Resource Protection	377 MSG/CEVQ	Valerie Renner, 846-8840	

Attachment 3. Preconstruction Permit Checklist (Concluded)

No.	Item	Responsible Organization	Base or Other Contact	Check
19.	Waste Management	377 MSG/CEVC	Steve Kitt, 846-9014 Art Thomas; Chugach 846-9751	
20.	Kirtland AFB and Site Specific Access	377 MSG/CEVR	377 MSG/CEVR Project Manager	
21.	Notify Affected Facility Manager	377 MSG/CEVR	377 MSG/CEVR Project Manager	
22.	Base communication for telephones		Ernest Millanez 846-1126 or 846-8411	
23.	Well Permits	New Mexico State Engineer's Office	John Dickenson; (505 764-3888, 121 Tijeras Ave NE, 2nd Floor	
24.	Site signage	377 MSG/CEVR	377 MSG/CEVR Project Manager	
25.	Air Quality	377 MSG/CEVR	Jennifer Dann 853-3481, Scott Clark 846-9017	

Attachment 4

Tetra Tech EC, Inc. Geosynthetics Installation Quality Control Manual

Tetra Tech EC, Inc.

GEOSYNTHETICS
INSTALLATION QUALITY CONTROL
MANUAL

PREPARED MARCH 8, 1996
REVISED September 28, 2006

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DESTRUCTIVE SEAM TESTING LOG

NON-DESTRUCTIVE TESTING REPORT

TETRA TECH EC, INC
INSTALLATION QUALITY CONTROL MANUAL

1.0 PURPOSE

1.0.1 This manual addresses the quality assurance and quality control of the installation of geomembrane liners, geosynthetic clay liners, geotextiles, geonets, and composites used by Tetra Tech EC, Inc (TtEC).

1.0.2 Quality assurance and quality control are defined as follows:

Quality Assurance- A planned system of activities that provide assurance that the facility was constructed as specified in the design. Quality Assurance refers to the means and actions employed by TtEC to assure conformity of the lining system as supplied and installed with the Project specific Quality Assurance plan, drawings, and specifications.

Quality Control- A planned system of inspections that are used to directly monitor and control the quality of a construction project. Quality Control refers to those actions taken by the manufacturers, fabricators, and TtEC to ensure that the materials and the workmanship meet the requirements of the plans and specifications.

2.0 MATERIAL APPROVAL

2.0.1 All synthetic materials supplied for the installation of the liner system will be verified for conformance to the specifications.

2.0.2 All synthetic materials will have a corresponding Quality Control/Quality Assurance certificate showing the manufacturer's test results from their internal Quality Control Program, including Raw Material certifications, and testing frequencies.

2.0.3 The suppliers will be required to submit a Statement of Compliance certifying the materials supplied meet or exceed the specifications.

2.0.4 Additional conformance testing may be required to ensure compliance of material.

3.0 HANDLING, DELIVERY, AND UNLOADING OF PRODUCTS

3.0.1 Geomembrane

3.0.1.1 Geomembrane rolls are typically shipped on flatbed trailers.

3.0.1.2 Geomembrane rolls are typically shipped with loading/carrying straps. Geomembrane rolls should be handled and unloaded using these straps with adequately sized equipment. If straps are not available, a fork lift with an approved stinger, or an axle bar assembly, will be used.

3.0.1.3 Unloading the geomembrane will be in accordance to the manufacturer's recommendations.

3.0.1.4 Precautions must be in place to ensure that no damage to the geomembrane occurs.

3.0.1.5 Pushing, sliding, or dragging rolls during unloading of the geomembrane will not be permitted.

3.0.1.6 Temporary storage should be in an area where standing water can not accumulate at any time.

3.0.1.7 If the geomembrane is temporarily stored on the ground, no stones or other sharp objects which could damage the geomembrane will be present.

3.0.1.8 Rolls of geomembrane will be stacked no more than 5 rolls high, or if the cores of the rolls crush, the height of the stack will be adjusted accordingly.

3.0.1.9 If storage of the liner at the jobsite will exceed 6 months, a temporary cover, such as a tarp or visqueen, should be placed over the liner.

3.0.1.10 See Table 1, Minimum Values for Smooth Black-Surfaced HDPE Geomembranes

3.0.2 Geotextile

3.0.2.1 Geotextile rolls are typically shipped via an enclosed container and each roll should be enclosed in a protective wrapping.

3.0.2.2 Unloading the geotextile will be in accordance to the manufacturer's recommendations. Typically, a stinger or roll puller is used to pull the rolls out of the enclosed container.

3.0.2.3 Precautions must be in place to ensure no damage to the geotextile occurs.

3.0.2.4 Since geotextiles are recognized as the most sensitive geosynthetic to UV degradation, all rolls must have a protective covering from the manufacturer. Any rolls delivered without this covering, will have a temporary cover placed over the geotextile to protect it from UV and weather.

3.0.2.5 Temporary storage should be in an area where standing water cannot accumulate at any time.

3.0.2.6 Rolls of geotextile should either be elevated or placed on a sacrificial sheet of plastic to ensure water from the ground does not wick through the geotextile.

3.0.2.7 Rolls of geotextile should be stacked in such a way that no damage to the cores occurs.

3.0.2.8 If storage of the geotextile at the jobsite will exceed 6 months, a temporary cover should be placed over the geotextile to protect it from UV and weather.

3.0.2.9 See Table 2, Minimum Average Roll Values (MARV) Required for Nonwoven Needlepunched Geotextiles

3.0.3 Geonet

3.0.3.1 Geonet rolls are typically shipped via an enclosed container or flatbed trailer.

3.0.3.2 Unloading of geonet will be in accordance with the manufacturer's recommendations. Typically, if the geonet is shipped in an enclosed container, a stinger or roll puller is used to pull the rolls out of the enclosed container; if the rolls are shipped on a flatbed trailer, loading/carrying straps will be used, or a forklift with an approved stinger or an axle bar assembly will be used.

3.0.3.3 Precautions must be in place to ensure no damage to the geonet occurs.

3.0.3.4 Temporary storage should be in an area where standing water can not accumulate at any time.

3.0.3.5 If the geonet rolls are not enclosed in a protective wrapping, the geonet must be protected from any material that would potentially clog the openings which would restrict the intended flow of the geonet. The geonet should be elevated off the ground or placed onto a sacrificial sheet of plastic. A temporary cover, such as a tarp or visqueen, should be placed over the geonet.

3.0.3.6 Rolls of geonet should be stacked in such a way that no damage to the cores occurs.

3.0.3.7 If storage of the geonet at the jobsite will exceed 6 months, a temporary cover, such as a tarp or visqueen, should be placed over the geonet.

3.0.4 Composite

3.0.4.1 Composites are a combination of both geotextiles and geonets. Composites will either be labeled single-sided (geotextile bonded to only one side of the geonet), or double-sided (geotextile bonded to both sides of the geonet).

3.0.4.2 Composite rolls are typically shipped via an enclosed container or flatbed trailer.

3.0.4.3 Unloading of the composite will be in accordance to the manufacturer's recommendations. Typically, if the composite is shipped in an enclosed container, a stinger or roll puller is used to pull the rolls out of the enclosed container; if the rolls are shipped on a flatbed trailer, loading/carrying straps will be used, or a forklift with an approved stinger or an axle bar assembly will be used.

3.0.4.4 Precautions must be in place to ensure no damage to the composite occurs.

3.0.4.5 Temporary storage should be in an area where standing water cannot accumulate at any time.

3.0.4.6 If the composite rolls are not enclosed in a protective wrapping, the composite must be protected from any material that would potentially clog the openings which would restrict the intended flow of the composite. The composite should be elevated off the ground or placed onto a sacrificial sheet of plastic. A temporary cover should be placed over the composite to protect it from UV and weather.

3.0.4.7 Rolls of composite should be stacked in such a way that no damage to the cores occurs.

3.0.4.8 If storage of the composite at the jobsite will exceed 6 months, a temporary cover should be placed over the composite to protect it from UV and weather.

3.0.5 Geosynthetic Clay Liner (GCL)

3.0.5.1 GCL rolls are typically shipped via an enclosed container or via a flatbed if the rolls are shrink-wrapped to protect the rolls against moisture.

3.0.5.2 Unloading the GCL will be in accordance with the manufacturer's recommendations.

3.0.5.3 Precautions must be in place to ensure no damage to the GCL occurs.

3.0.5.4 Temporary storage must ensure no water from any source will come into contact with the GCL. The GCL can be stored in the enclosed shipping container, or stored on high flat ground or elevated off of the ground utilizing a temporary cover, so long as no water comes into contact with the GCL. Steps must be taken to ensure the storage area does not create a dam resulting in ponding water.

3.0.5.5 If a platform is utilized to elevate the GCL, it is recommended the platform be built so the entire roll of GCL is supported.

3.0.5.6 Rolls of GCL will be stacked in accordance to the manufacturer's recommendations. Stacking should not cause thinning of the product at points of contact.

4.0 INSTALLATION

4.0.1 Geomembrane

4.0.1.1 Panels are installed only after the sub grade has been visually inspected and accepted by TtEC.

4.0.1.1.a TtEC will verify by visual inspection that there are no materials in the sub grade that would damage the geomembrane.

4.0.1.1.b No sharp stones or objects that could damage the liner should be present.

4.0.1.1.c Surfaces to be lined should provide a firm, unyielding foundation with no sudden, sharp or abrupt changes or break in grade.

4.0.1.1.d No panels will be installed in standing water.

4.0.1.1.e No panels will be installed during inclement weather or where the safety of the crew is in jeopardy. This would include, but not limited to, falling precipitation of any kind, high winds, blowing dust, or extreme cold or hot ambient conditions.

4.0.1.2 All panels will be installed in a manner consistent with the specifications and in a manner best suited to existing site conditions.

4.0.1.3 Panels will be installed one at a time, and seamed immediately after placement. Panels installed that cannot be welded must be adequately secured so no damage to the geomembrane or sub grade occurs.

4.0.1.4 Each panel will be given a panel number, and will be recorded on daily work reports as well as the record drawing.

4.0.1.5 Anchor trenches should be excavated to the lines and widths shown in the design drawings.

4.0.1.5.a The top edges of the anchor trench should be slightly rounded to avoid sharp bends in the liner.

4.0.1.5.b No large rocks or clay lumps will be allowed to underlie the liner in the anchor trench.

4.0.1.6 The equipment used for installation will not damage the geomembrane.

4.0.1.7 Ballast's, such as sandbags, will be used in the presence of wind, or if TtEC deems it necessary.

4.0.1.7.a Ballast's will be placed on all exposed edges when work ceases.

4.0.1.7.b Additional ballast's may be necessary during extreme windy conditions.

4.0.1.8 Care will be taken to ensure equipment used to deploy the geomembrane does not damage the sub grade.

4.0.1.9 No personnel working on the geomembrane will smoke, wear damaging shoes, or engage in activities that could damage the geomembrane.

4.0.1.10 Expansion and contraction of the geomembrane must be considered during placement.

4.0.2 Geotextile, Geonet, and Composite

4.0.2.1 Panels are installed only after the sub grade or geomembrane has been inspected and accepted by TtEC.

4.0.2.1.a Stones, mud, and/or dirt should not be present that would get entrapped during installation.

4.0.2.2 All panels will be installed in a manner consistent with the specifications and in a manner best suited to the existing site conditions.

4.0.2.2.a A rub sheet may be necessary whenever composite is deployed on top of a textured liner and is pulled into place.

4.0.2.3 Care will be taken to ensure handling and deployment does not damage the materials in any way.

4.0.2.4 Care will be taken to ensure the underlying materials are not damaged during placement.

4.0.2.5 The material should be kept in tension as much as possible.

4.0.2.6 Ballast's, such as sandbags, will be used in the presence of high winds, or if TtEC deems it necessary.

4.0.2.6.a Ballast's will be placed on all exposed edges when work ceases.

4.0.2.6.b Additional ballast's may be necessary during extreme windy conditions.

4.0.2.7 Trimming and cutting of this material placed on top of geomembrane will be performed utilizing a "hook" blade or scissors.

4.0.2.8 No personnel working on the geotextile, geonet, or composite will smoke, wear damaging shoes, or engage in activities that could damage the geomembrane.

4.0.3 Geosynthetic Clay Liner (GCL)

4.0.3.1 Panels should be installed in general accordance with the manufacturer's recommendations.

4.0.3.2 Panels are installed only after the subgrade has been visually inspected and accepted by TtEC.

4.0.3.2.a No panels will be installed in standing water or on surfaces where the water content could be detrimental to the GCL.

4.0.3.2.b Hydration of the GCL must be avoided.

4.0.3.2.c TtEC will verify by visual inspection that there are no materials in the sub grade that would damage the GCL.

4.0.3.2.d Surfaces to be lined should provide a firm, unyielding foundation.

4.0.3.2.e No panels will be installed during inclement weather, particularly, precipitation of any kind, which would cause hydration of the GCL.

4.0.3.4 All panels will be installed in a manner consistent with the specifications and in a manner best suited to the existing site conditions.

4.0.3.5 Care will be taken to ensure handling and deployment does not damage the GCL in any way. A rub sheet may be necessary when Textured liner is deployed on top of the GCL.

4.0.3.6 Care will be taken to ensure the equipment used to deploy the GCL does not damage the sub grade or underlying materials.

4.0.3.7 All panels of GCL will be covered by the geomembrane on the same day.

4.0.3.8 Additional measures may have to be implemented to ensure water does not damage the installed GCL. This would include, but not be limited to, extending the FML beyond the end of the GCL so that no GCL remains exposed. The edge of the FML will be temporarily buried so that no moisture is allowed to run under the FML and hydrate the GCL. Temporary diversion berms may also be necessary to divert any type of running water away from the GCL.

5.0 SEAMING AND JOINING

5.0.1 Geomembrane

5.0.1.1 All field personnel performing seaming operations will be qualified by field experience and training.

5.0.1.2 All welding equipment used will have the appropriate monitoring controls as manufactured to measure and ensure properly operating equipment.

5.0.1.3 Overlapping of the geomembrane will be in accordance with the manufacturer's recommendations, usually 3" to 6".

5.0.1.4 In general, seams will be oriented parallel to the line of maximum slope; i.e., oriented along and not across the slope.

5.0.1.4.a In corners and odd shaped geometric locations, the number of seams should be minimized.

5.0.1.4.b Horizontal seams should be a minimum of 5' from the toe of slope, crest of berm, or areas of potential stress concentrations.

5.0.1.4.c Occasionally, due to site conditions, a cross-seam will fall on a slope. To avoid a horizontal seam on a slope, the cross-seam must be cut so that the resulting seam is at a 45° angle or greater.

5.0.1.5 A seam numbering system compatible with the panel numbering system will be utilized. This will be recorded on the record drawings.

5.0.1.6 The approved welding apparatus' are hot wedge (fusion) welder and extrusion welder.

5.0.1.6.a The primary welder will be the wedge welder. It will be automated and capable of producing a double seam. It will be equipped with gauges giving the applicable temperature and speed settings.

5.0.1.6.b The extrusion welder will be used on seams that can not be welded with the wedge welder; for repairs; some "cap stripping"; beads; "T" joints; and appurtenances. It will be equipped with gauges that give the applicable temperature settings.

5.0.1.7 Prior to seam welding, a pre-weld or trial seam will be performed on pieces of the same type of liner to qualify the welding equipment and the operator.

5.0.1.7.a Trial seams will be performed at a minimum of once per day, whenever there is a change in operators, or if the welder has been turned off.

5.0.1.7.b Trial seams will be performed in conditions that mirror field conditions.

5.0.1.7.c Trial seam samples should be approximately 3' long.

5.0.1.7.d Both shear and peel tests will be performed utilizing a field tensiometer. Unless otherwise specified, 3 coupons will be cut from the sample using a die cutter; 2 will be tested in peel and 1 will be tested in shear. The seam should not fail in either test.

5.0.1.7.e If a sample fails, the entire operation must be repeated.

5.0.1.7.f No welding equipment or operator will be allowed to weld until a pre-weld has been successfully passed.

5.0.1.8 Seam preparation is crucial in obtaining quality welds.

5.0.1.8.a Prior to welding, the seam must be free of moisture, dirt, or any debris.

5.0.1.8.b Due to wet sub grade conditions, it may be necessary to place a sacrificial "rub sheet" under the seam to act as a barrier against moisture, ice, or muddy conditions.

5.0.1.8.c Heat tacking and grinding will be performed on seams that are extrusion welded. A hot air device will be used to "tack" weld the area. Grinding of the liner adjacent to the seam must be performed to

remove oxidation. Grinding should not remove more than 10% of the liner and should not extend more than 1/4" beyond the extrudate.

5.0.1.9 Fish mouths will be cut from the seam and repaired accordingly.

5.0.1.10 Seaming will extend along panel edges into the anchor trench.

5.0.1.11 Under no circumstances, can welding occur in the presence of moisture, standing or ponding water, precipitation of any kind, dew, ice, or in conditions where moisture from any source is in the welding path.

5.0.1.12 Any welding defects are to be identified and repaired per section 8.0.

5.0.2 Geotextile, Geonet, and Composite

5.0.2.1 Geotextiles will be seamed by overlapping, by thermal bonding, or by sewing as specifications dictate.

5.0.2.1.a If sewing is required, the thread used will be a polymeric material with chemical resistance similar to the geotextile.

5.0.2.1.b Any defects are to be identified and repaired per section 8.0.

5.0.2.2 Geonets may be butt joined or overlapped.

5.0.2.2.a Nylon plastic ties or fasteners will be applied to the net edge at 5' intervals along the edge.

5.0.2.2.b End splices will be made as follows: On slopes, the ends will overlap 2' with the uphill panel on top and two rows of ties applied on 6" centers. In flat areas, the ends will overlap a minimum of 2" and one row of 3 ties will be applied.

5.0.2.2.c Any defects are to be identified and repaired per section 8.0.

5.0.2.3 Composites will be overlapped as specified, with the net portion tied as specified above, and the geotextile component thermally bonded or sewn as the specification dictates.

5.0.2.3.a Any defects are to be identified and repaired per section 8.0.

5.0.3 Geosynthetic Clay Liner

5.0.3.1 GCL's will be overlapped and joined in accordance to the manufacturer's recommendations.

5.0.3.1.a Any defects are to be identified and repaired per section 8.0.

6.0 FIELD TESTING

6.0.1 Geomembrane

6.0.1.1 Visual Inspection

6.0.1.1.a The entire membrane is to be carefully inspected for any defects in the material or welding during the installation.

6.0.1.1.b Any area requiring remediation, must be clearly marked and repaired per section 8.0.

6.0.1.2 Non-destructive testing on all field seams using air pressure testing, vacuum testing, or other approved methods as applicable.

6.0.1.3 Air pressure testing will be performed only on seams welded with a wedge welder capable of producing dual seams with an air channel.

6.0.1.3.a An air pump equipped with an air gauge capable of producing pressures between 25 psi and 40 psi will be used to pressurize the channel.

6.0.1.3.b A hollow needle and clamp assembly will be connected to the pump and will be used to pressurize the channel.

6.0.1.3.c Prior to sealing the end of the channel, a check should be made to verify a clear passage. As air is forced into the channel at one end of the seam, air flowing through the channel should be detected at the other end.

6.0.1.3.d If air is detected flowing through the entire channel, then seal the end opposite the pump, and pressurize the channel.

6.0.1.3.e If air can not be detected, a block in the channel has probably occurred. The blockage can be found by reducing the channel length in halves until the blockage is identified. The rest of the channel should then be sealed opposite the pump, and the channel pressurized. Remediation of the blocked channel will occur to ensure a homogenous bond.

6.0.1.3.f Energize the air pump to pressurize the channel between 25 psi and 40 psi. The minimum pressure will be in accordance to the manufacturer’s recommendations.

6.0.1.3.g Immediately after the air channel is pressurized, the pressure may drop and then stabilize. The amount of pressure drop is dependent on the thickness of the geomembrane as well as ambient conditions. If the pressure drops below the required specification, re-energize the channel to the required pressure.

6.0.1.3.h Once the channel has been pressurized, shut off the pump, and monitor the air pressure for 5 minutes. There should be no more than 3 psi drop in pressure from the minimum pressure allowed.

6.0.1.3.i Record the results

6.0.1.3.j If the loss of pressure exceeds the allowable, or if the channel can not be stabilized, locate the faulty area as described in section

6.0.1.3.k Any repairs to the welded seam will be in accordance with Section 8.0.1.

6.0.1.3.l If the channel will not hold the required pressure, visual observation or listening for air escaping frequently will determine the location of the leak. Any repairs to the welded seam will be in accordance with Section 8.0.1.

6.0.1.4 Vacuum testing will be performed on seams that have been welded by the extrusion method, on seams welded using a solid wedge welder, and on seams where it is not possible to pressure test.

6.0.1.4.a There are several types of vacuum boxes available. The vacuum unit will be capable of producing and maintaining a vacuum. The view box must have a transparent viewing window and will be connected to the vacuum tank. A pressure gauge will either be attached to the vacuum tank or to the view box.

6.0.1.4.b Wet a section of the seam to be tested with soapy water.

6.0.1.4.c Place the view box over the area and create a vacuum. Ensure that a leak tight seal is created between the view box and the liner.

6.0.1.4.d View the area through the transparent window for approximately 10 seconds. If no bubbles are evident, then the area is considered passing.

6.0.1.4.e If air bubbles are evident, mark the area for repair, perform the repair, and repeat the vacuum test.

6.0.1.4.f Record the results.

6.0.1.4.g Any repairs to the welded seam will be accordance with Section 8.0.1.

6.0.1.5 Additional non-destructive testing.

6.0.1.5.a If air testing or vacuum testing can not be performed, other options may be considered. Any additional options must be discussed with the installer.

6.0.2 Geotextile, Geonet, and Composite

6.0.2.1 Visual Inspection

6.0.2.1.a The entire panel of geotextile, geonet, and composite will be carefully inspected for any defects in the material during the installation.

6.0.2.1.b Any area requiring remediation, must be clearly marked and repaired in accordance with the manufacturer's recommendations and section 8.0.

6.0.3 Geosynthetic Clay Liner (GCL)

6.0.3.1 Visual Inspection

6.0.3.1.a The entire panel of GCL will be carefully inspected for any defects in the material during the installation.

6.0.3.1.b Any area requiring remediation, must be clearly marked and repaired in accordance with the manufacturer's recommendations and section 8.0.

7.0 DESTRUCTIVE SEAM TESTING

7.0.1 Introduction

7.0.1.1 Destructive testing of seams is conducted to provide direct evaluation of seam strength and bonding efficiency. Destructive testing involves two types of tests: Shear testing, applies a tensile stress from the top sheet through the weld and into the bottom sheet; Peel testing peels the top sheet back against the overlapped edge of the bottom sheet to observe how separation occurs.

7.0.1.2 The appropriate seam strength values and appropriate ASTM procedures must be clearly identified and agreed to.

7.0.2 Location and Frequency

7.0.2.1 The location and frequency is usually identified in the site specifications. Tests should be taken at randomly selected locations. Unless otherwise

specified, one sample per 500 linear feet of weld per welding technician will be tested.

7.0.2.2 The welding operator will not be informed in advance of sample locations.

7.0.3 Sampling Procedures

7.0.3.1 Samples will be cut by a TtEC installation employee. When cutting samples above an existing geomembrane, "hook blades" will be used.

7.0.3.2 A number shall be assigned to each sample.

7.0.3.3 Sample numbers and locations will be recorded on the record drawings.

7.0.3.4 A log will be kept to track all destructive samples and subsequent test results.

7.0.3.5 All holes in the geomembrane resulting from destructive sampling will be repaired per section 8.0.

7.0.4 Size of Samples

7.0.4.1 Unless otherwise specified, at a minimum, samples shall be 12" by 36", with the seam running parallel to the length.

7.0.4.2 Three 12" long samples will be cut and distributed as follows: 1 sample to FWEC; 1 sample to the third party inspector; 1 sample to the owner for archive.

7.0.5 Field Testing

7.0.5.1 An electric tensiometer with a digital readout must be used to accurately evaluate seam integrity in the field.

7.0.5.2 Unless otherwise specified, FWEC will test the destructive samples in the field.

7.0.5.3 Coupons must be cut using an approved die cutter. The coupon are to be 1" wide strips.

7.0.5.4 Unless otherwise specified, 10 coupons will be cut from the sample. 5 coupons will be tested in peel, and 5 in shear.

7.0.5.4.a The required values for seam strengths will be as specified by NSF (National Sanitation Foundation) 54, and/or FTB (Film Tear Bond) and the seam strength meets or exceeds the manufacturer's recommendations. The appropriate ASTM testing procedures will be utilized.

7.0.5.5 The test results will be recorded accordingly.

7.0.5.6 The seam is considered passing if 4 out of 5 coupons pass this criteria.

7.0.5.6 The results of the field tests will be compared to the owners and/or third party lab results. Should a discrepancy occur, FWEC has the right to evaluate the results and make corrections as needed.

7.0.6 Procedures For Destructive Test Failure

7.0.6.1 The following two procedures will apply whenever a sample fails a destructive test:

7.0.6.1.a Reconstruct the seam between any two passed destructive test locations.

7.0.6.1.b Reconstruct the seam/s welded by the welding machine and operator that day.

7.0.6.2 Reconstruction of the seam will be performed by removing the defective seam completely and re-welding the seam; or welding the upper flap of the geomembrane seam by the extrusion method; placing a cap strip over the defective seam with the same type of liner and welding by the extrusion method.

7.0.6.3 Trace the welding path to an intermediate location 10' from the point of the failed test in each direction. Pull and test a sample coupon in the field. If these sample coupons pass, then full samples are taken. If these samples pass, the seam is reconstructed between these two locations. If either sample fails, the process is repeated.

7.0.6.4 All acceptable seams must be bounded by passing destructive samples.

7.0.6.5 Documentation of all failed destructive seams will be recorded and shown on the record drawings.

8.0 REPAIR PROCEDURES

8.0.1 Geomembrane

8.0.1.1 All seams and all panels of the geomembrane will be visually inspected by TtEC to identify defects, which includes the geomembrane and installation.

8.0.1.2 Any seam failing destructive or non-destructive seam testing, or any defect found in the geomembrane will be repaired by one of the following methods:

8.0.1.2.a Patching: used to repair large holes, tears, and destructive sample cutouts;

8.0.1.2.b Buffing and re-welding: used to repair small sections of extrusion welded seams;

8.0.1.2.c Spot welding or seaming: used to repair pinholes or other minor localized flaws;

8.0.1.2.d Capping: used to repair large length of failed seams; and

8.0.1.2 e Topping: used to repair areas of inadequate seams which have an exposed edge.

8.0.1.3 In addition, the following will be performed:

8.0.1.3.a Patches or cap strips will extend 6” beyond the edge of the defect or cutout;

8.0.1.3.b All corners of the patches will be rounded;

8.0.1.3.c All surfaces must be clean and dry at the time of the repair; and

8.0.1.3.d The welding will be performed by approved welding machines.

8.0.1.4 All repairs will be non-destructively tested.

8.0.1.5 All repairs will be documented.

8.0.2 Geotextile, Geonet, and Composite

8.0.2.1 Any holes, tears, or defective areas in the geotextile will be repaired by placing a patch of the same geotextile over the suspect area and seaming by an approved method. The patch will extend 12” beyond the hole, tear, or defect in all directions.

8.0.2.2 Any tears or defects in the geonet will be repaired by placing a patch of the same geonet over the suspect area and attaching with approved net ties. The patch will extend 6” beyond the tear or defect in all directions.

8.0.2.3 Any holes, tears, or defects in the composite will be repaired by the appropriate methods described in sections 8.0.2.1 and 8.0.2.2.

8.0.3 Geosynthetic Clay Liner (GCL)

8.0.3.1 All repairs to the GCL will be in accordance to the manufacturer’s recommendations.

9.0 BACKFILLING OF THE ANCHOR TRENCH

9.0.1 "U" Shaped Trench

9.0.1.1 "U" shaped anchor trenches are more desirable for slope applications. The depth of the trench must be considered in the overall design of the liner system.

9.0.1.2 In most cases, the liner should only extend across the floor of the anchor trench to avoid folding of the liner on itself from extensions up the back wall.

9.0.1.3 Backfilling of the anchor trench must be coordinated with the installer. Backfilling too quickly could result in bridging of the liner on the slope; leaving the anchor trench exposed too long could create slippage of the panels on the slope and/or damage by high winds.

9.0.1.4 Extreme care must be taken when backfilling the anchor trench to avoid damaging the geomembrane. The material used to backfill the anchor trench should be approved by the specifications.

9.0.2 "V" Shaped Trench

9.0.2.1 "V" shaped anchor trenches are used on non-slope applications. The depth of the trench must be considered in the overall design of the liner system.

9.0.2.2 In most cases, the liner should extend through the bottom and extend half-way up the other side.

9.0.2.3 Backfilling of the anchor trench must be coordinated with the installer. Backfilling too quickly could result in bridging of the liner; leaving the anchor trench exposed too long could create slippage of the panels and/or damage by high winds.

9.0.2.4 Extreme care must be taken when backfilling the anchor trench to avoid damaging the geomembrane. The material used to backfill the anchor trench should be in accordance to the specifications.

10.0 MATERIALS IN CONTACT WITH THE GEOMEMBRANE

10.0.1 Any material coming onto contact with the liner system must meet the manufacturer's recommendations. Geotextiles may be used to protect the geomembrane if Subgrade or backfill materials are marginal and if the manufacturer recommends this.

10.0.2 Extreme care must be taken when covering geomembranes. Manufacturer's warranties are explicit in stating mechanical damage will not be considered a warranty repair.

11.0 APPURTENANCES AND MECHANICAL ATTACHMENTS

11.0.1 Appurtenances will be built per the specifications utilizing the same materials.

11.0.2 Welding of the appurtenance by the extrusion method to HDPE pipe is preferable; however, there must be enough room for the welder to weld the end of the appurtenance completely.

11.0.3 Mechanical attachments will be installed as specified. Several types of mechanical attachments are available:

11.0.3.1 Stainless Steel Batten;

11.0.3.2 Stainless Steel Pipe Clamps;

11.0.3.3 Stainless Steel Banding;

11.0.3.4 HDPE Bedding Channel.

12.0 ACCEPTANCE AND COMPLETION

12.0.1 Acceptance and completion will be determined when all geosynthetics supplied have been verified meeting or exceeding the specifications and all geosynthetics have been installed in accordance to the specifications and/or installation manual, including passing results of all required testing.

13.0 REFERENCES FOR HDPE GEOMEMBRANES

ASTM D 5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles

ASTM D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

ASTM D 4533, Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles

ASTM D 4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products

ASTM D 4491, Standard Test Method for Water Permeability of Geotextiles by Permittivity

ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile

ASTM D 4354, Standard Practice for Sampling of Geosynthetics for Testing

ASTM D 4759, Standard Practice for Determining the Specifications Conformance of Geosynthetics

14.0 REFERENCES FOR GEOTEXTILES

American Society for Testing and Materials (ASTM)

1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
4. D 1603 Test Method for Carbon Black in Olefin Plastics
5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
6. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
7. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
8. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
9. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
10. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes
11. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
12. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

Geosynthetic Research Institute

1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
2. GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

TABLES

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Table 1: Minimum Values for Smooth Black-Surfaced HDPE Geomembranes

TESTED PROPERTY	TEST METHOD	FREQUENCY	MINIMUM VALUE				
Product Code			HDE 030A000	HDE 040A000	HDE 060A000	HDE 080A000	HDE 100A000
Thickness, (minimum average) mil (mm)	ASTM D 5199	every roll	30 (0.75)	40 (1.00)	60 (1.50)	80 (2.00)	100 (2.50)
Lowest individual reading (-10%)			27 (0.69)	36 (0.91)	54 (1.40)	72 (1.80)	90 (2.30)
Density, g/cm^3	ASTM D 1505	200,000 lb	0.94	0.94	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 6693, Type IV	20,000 lb					
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm		114 (20)	152 (27)	228 (40)	304 (53)	380 (67)
Strength at Yield, lb/in-width (N/mm)			63 (11)	84 (15)	126 (22)	168 (29)	210 (37)
Elongation at Break, %	G.L. 2.0 in (51 mm)		700	700	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)		12	12	12	12	12
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb	21 (93)	28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb	54 (240)	72 (320)	108 (480)	144 (640)	180 (800)
Carbon Black Content, %	ASTM D 1603	20,000 lb	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb	+Note 1	+Note 1	+Note 1	+Note 1	+Note 1
Notched Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lb	300	300	300	300	300
REFERENCE PROPERTY	**TEST METHOD**	**FREQUENCY**	**NOMINAL VALUE**				
Oxidative Induction Time, min	ASTM D 3895, 200° C; O_2, 1 atm	200,000 lb	>100	>100	>100	>100	>100
Roll Length[1] (approximate), ft (m)			1,120 (341)	870 (265)	560 (171)	430 (131)	340 (104)
Roll Width[1], ft (m)			22.5 (6.9)	22.5 (6.9)	22.5 (6.9)	22.5 (6.9)	22.5 (6.9)
Roll Area, ft^2 (m^2)			25,200 (2,341)	19,575 (1,819)	12,600 (1,171)	9,675 (899)	7,650 (711)

NOTES:

- +Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- GSE HD is available in rolls weighing about 3,900 lb (1,769 kg)
- All GSE geomembranes have dimensional stability of ±2% when tested with ASTM D 1204 and LTB of <-77° C when tested with ASTM D 746.
- [1]Roll lengths and widths have a tolerance of ± 1%.

Table 2: Minimum Average Roll Values (MARV) Required for Nonwoven Needlepunched Geotextiles

TESTED PROPERTY	TEST METHOD	FREQUENCY	NW4	NW6	NW8	NW10	NW12	NW16
Product Code			GEO 0408002	GEO 0608002	GEO 0808002	GEO 1008002	GEO 1208002	GEO 1608002
AASHTO M288 Class			3	2	1	>1	>>1	>>>1
Mass per Unit Area, oz/yd^2 (g/m^2)	ASTM D 5261	90,000 ft^2	4 (135)	6 (200)	8 (270)	10 (335)	12 (405)	16 (540)
Thickness	ASTM D 5199	1/90,000 ft^2	45 mil	70 mil	80 mil	100 mil	110 mil	155 mil
Grab Tensile Strength, lb (N)	ASTM D 4632	90,000 ft^2	120 (530)	170 (755)	220 (975)	260 (1,155)	320 (1,420)	390 (1,735)
Grab Elongation, %	ASTM D 4632	90,000 ft^2	50	50	50	50	50	50
Puncture Strength, lb (N)	ASTM D 4833	90,000 ft^2	60 (265)	90 (395)	120 (525)	165 (725)	190 (835)	240 (1,055)
Trapezoidal Tear Strength, lb (N)	ASTM D 4533	90,000 ft^2	50 (220)	70 (310)	95 (420)	100 (445)	125 (555)	150 (665)
Apparent Opening Size, Sieve No. (mm)	ASTM D 4751	540,000 ft^2	70 (0.212)	70 (0.212)	80 (0.180)	100 (0.150)	100 (0.150)	100 (0.150)
Permittivity, sec^{-1}	ASTM D 4491	540,000 ft^2	1.50	1.50	1.50	1.20	0.80	0.70
Permeability, cm/sec	ASTM D 4491	540,000 ft^2	0.22	0.30	0.30	0.30	0.29	0.27
Water Flow Rate, gpm/ft^2 (l/min/m^2)	ASTM D 4491	540,000 ft^2	120 (4,885)	110 (4,480)	110 (4,480)	85 (3,460)	60 (2,440)	50 (2,035)
UV Resistance (% retained after 500 hours)	ASTM D 4355	per formulation	70	70	70	70	70	70
Roll Length[1], ft (m)			600 (182)	600 (182)	600 (182)	300 (91)	300 (91)	300 (91)
Roll Width[1], ft (m)			15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)
Roll Area, ft^2 (m^2)			9,000 (836)	9,000 (836)	9,000 (836)	4,500 (418)	4,500 (418)	4,500 (418)

NOTES:

- The property values listed are in weaker principal direction. All values listed are Minimum Average Roll Values (MARV) except apparent opening size in mm and UV resistance. Apparent opening size (mm) is a Maximum Average Roll Value. UV is a typical value.
- [1]Roll lengths and widths have a tolerance of ±1%.

APPENDIX A

SAMPLES OF FIELD PAPERWORK

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TETRA TECH EC, INC.
TRIAL SEAM TESTING LOG

PROJECT:_____ LOCATION:_____ DATE: _____

Extrusion: **Minimum Value: Peel** _____ **Shear** _____ ***Page*** _____***0f*** _____

Time	Machine	Welder ID	PreHeat	Extruder	Peel	Peel	Peel	Peel	Peel	Shear	Material Type	Pass/Fail
										/ / / /		
Time	Machine	Welder ID	PreHeat	Extruder	Peel	Peel	Peel	Peel	Peel	Shear	Material Type	Pass/Fail
										/ / / /		
Time	Machine	Welder ID	PreHeat	Extruder	Peel	Peel	Peel	Peel	Peel	Shear	Material Type	Pass/Fail
										/ / / /		
Time	Machine	Welder ID	PreHeat	Extruder	Peel	Peel	Peel	Peel	Peel	Shear	Material Type	Pass/Fail
										/ / / /		
Time	Machine	Welder ID	PreHeat	Extruder	Peel	Peel	Peel	Peel	Peel	Shear	Material Type	Pass/Fail
										/ / / /		

Fusion: **Minimum Values: Peel** _____ **Sheer** _____

Time	Machine	Welder ID	Temp.	Speed	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Shear	Material Type	Pass/Fail
					/	/	/	/	/	/ / / /		
Time	Machine	Welder ID	Temp.	Speed	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Shear	Material Type	Pass/Fail
					/	/	/	/	/	/ / / /		
Time	Machine	Welder ID	Temp.	Speed	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Shear	Material Type	Pass/Fail
					/	/	/	/	/	/ / / /		
Time	Machine	Welder ID	Temp.	Speed	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Shear	Material Type	Pass/Fail
					/	/	/	/	/	/ / / /		
Time	Machine	Welder ID	Temp.	Speed	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Peel In/Out	Shear	Material Type	Pass/Fail
					/	/	/	/	/	/ / / /		

INSTALLERS SIGNATURE: _____ QC SIGNATURE: _____

TETRA TECH EC, INC.

TENSILE PROPERTY VERIFICATION SHEET FOR LINER

Project Name:______________________ **Date:**_______________ **Location:**_______________________

roll number	material type	peak value	peak value	peak value	peak value	peak value	average peak value

TETRA TECH EC, INC.
GEOSYNTHETICS SEAM TESTING

PROJECT:_____ **DATE:**_____ **LOCATION:**_____

PRE-WELD QUALIFICATION:

mach. #	tech ID	inner track value peel	outer track value peel	shear	pass/fail	time

DESTRUCTIVE TESTING:

sample #	seam #	date pulled	date welded	welded by	inner track value peel	outer track value peel	shear	pass fail	exact location	3rd party confirm

INSTALLERS SIGNATURE_____ QC SIGNATURE_____

TETRA TECH EC, INC.
REPAIR LOG

Project Name _____
Location _____
Date _____
Page _____ of _____
Prepared by _____

HDPE ___ Smooth ___
LLDPE ___ Textured ___

Thickness Mils _____

Repair #	Code	Repair Date	Patch Location	Repair Type	Welder ID	Vacuum Test		Comments
						P/F	Date	

Defect Code:

SI-Surface Irregularity
CR- Crease
DS- Destructive test
WS- Welder Recut
EE- Earthwork Equip. Damage
FM- Fishmouth
FT- Pressure Test Cut
Other
BO- Burn Out
T- T Joint
WR- Wrinkle

Repair Type:

C- Cap Strip
P- Patch
B- Bead

TETRA TECH EC, INC.
RECEIPT OF MATERIALS AND INSPECTION REPORT

PROJECT:_____ DATE:_____ LOCATION:_____

Type of Material:_____ Received by:_____
Supplier:_____ Inspector:_____
Transporter:_____ Bill of Lading Number:_____
Quantity Delivered:_____

Roll Number	length	width	condition of material	material QC's	notes/comments
1).					
2).					
3).					
4).					
5).					
6).					
7).					
8).					
9).					
10).					
11).					
12).					
13).					
14).					
15).					
16).					
17).					
18).					
19).					
20).					
21).					
22).					
23).					
24).					
25).					
26).					
27).					
28).					
29).					
30).					

INSTALLERS SIGNATURE_____ QC SIGNATURE_____

TETRA TECH EC, INC.
PANEL PLACEMENT AND PANEL SEAMING REPORT

PROJECT:_____ **DATE:**_____ **LOCATION:**_____

PAGE _____ **OF** _____ **SEAMING DATA ONLY APPLICABLE TO LINER**

material type	panel #	roll #	seam #	panel length	panel width	seam length	seamer #	machine #	comments

INSTALLERS SIGNATURE_____ **QC SIGNATURE**_____

TETRA TECH EC, INC.
NON-DESTRUCTIVE TESTING REPORT

PROJECT_____ **DATE**_____ **LOCATION**_____

PAGE _____ **OF** _____

material type	seam #	seam length	tester ID	AIR TESTING: start press.	end press.	variance	start time	end time	pass/ fail	VT pass/fail	comments

INSTALLERS SIGNATURE_____ **QC SIGNATURE**_____

TETRA TECH EC, INC.
DESTRUCTIVE SEAM TESTING LOG

PROJECT:_____ **DATE:**_____ **LOCATION:**_____

Sample Number:_____ Seam Number:_____

Type of Material:_____ Machine Number:_____ Welder ID:_____ Date Welded:_____

Type of Weld (wedge or extrusion):_____ Speed:_____ Temperature:_____ Pressure:_____

WEDGE

Required Peel value:_____

PEEL (LBS/IN.)		Type of Failure
inner 1		
inner 2		
inner 3		
inner 4		
inner 5		
outer 1		
outer 2		
outer 3		
outer 4		
outer 5		

average:_____

average:_____ pass/fail:_____

Required Shear Value:_____

SHEAR (LBS/IN.)		Type of Failure
coupon 1		
coupon 2		
coupon 3		
coupon 4		
coupon 5		

average:_____ pass/fail:_____

EXTRUSION

Required Peel Value:_____

PEEL (LBS/IN.)		Type of Failure
coupon 1		
coupon 2		
coupon 3		
coupon 4		
coupon 5		

average:_____

pass/fail:_____

Required Shear Value:_____

SHEAR (LBS/IN.)		Type of Failure
coupon 1		
coupon2		
coupon3		
coupon 4		
coupon 5		

average:_____

pass/fail:_____

INSTALLERS SIGNATURE_____ **QC SIGNATURE**_____

TETRA TECH EC, INC.
TRIAL SEAM TESTING LOG

PROJECT:_____ DATE:_____ LOCATION:_____

Type of Material:_____ Machine Number:_____ Welder ID:_____

WEDGE

TEMP & SPEED

am	noon	close

Required Peel value:_____

	PEEL (LBS/IN.)		
	am	noon	close
inner 1			
inner 2			
inner 3			
inner 4			
inner 5			
av. value			
outer 1			
outer 2			
outer 3			
outer 4			
outer 5			
av. value			
pass/fail			

Required Shear Value:_____

	SHEAR (LBS/IN.)		
	am	noon	close
coupon 1			
coupon 2			
coupon 3			
coupon 4			
coupon 5			
av. value			
pass/fail			

INSTALLERS SIGNATURE_____

EXTRUSION

TEMP

am	noon	close

Required Peel Value:_____

	PEEL (LBS/IN.)		
	am	noon	close
coupon 1			
coupon 2			
coupon 3			
coupon 4			
coupon 5			
av. value			
pass/fail			

Required Shear Value:_____

	SHEAR (LBS/IN.)		
	am	noon	close
coupon 1			
coupon2			
coupon3			
coupon 4			
coupon 5			
av. value			
pass/fail			

QC SIGNATURE_____

Attachment 5

Quality Control Report Forms

TETRA TECH EC, INC.
FIELD ACTIVITY DAILY LOG

DATE: **DAY:** **REPORT NUMBER:**

PROJECT NAME: **PROJECT # :**
CUSTOMER: **TASK ORDER #:**
TtEC PM:
SAFETY MEETING TIME: **SAFETY MEETING TOPIC:**
WEATHER:

CRAFT	HOURS	WBS CODE
EQUIPMENT		
TtEC PROFESSIONAL STAFF		
QA/QC OFFICER:		
HEALTH & SAFETY OFFICER:		
SUPERINTENDENT:		
PROJECT MANAGER:		
PROJECT ENGINEER:		

PRODUCTION SHIFT START: **SHIFT END:**

TOTAL HOURS WORKED ON SITE TODAY:	
TOTAL PROJECT HOURS WORKED ON SITE:	

VISITORS:
SIGNATURE: **DATE:**

MATERIALS INSPECTION CHECKLIST

ITEM:				**DATE:**
Contract Specifications				
Material	**Qty**	**Condition**	**Testing**	**Comments**
STORAGE CONDITIONS:				
SUBMITTALS:				

Page 1 of 2

MATERIALS INSPECTION CHECKLIST (Concluded)

MATERIAL/EQUIPMENT CERTIFICATIONS:
PREPARATORY SITE CONDITIONS:
CONTRACT VARIANCE:
COMMENTS:

ATTENDEES:			
			QC Representative Date
			QCPM Date

Page 2 of 2

REMEDIAL ACTION PUNCHLIST

LOCATION: _____

OR FEATURE INSPECTED: _____

_____

_____

Report Reference Numbers
if a Deficiency Report is Required

_____

_____

ITEM NO.		OBSERVATION DATE	CORRECTION DATE

REMARKS:

CQC Systems Manager: _____

Final Issue Date: _____

REWORK ITEMS LIST

Number	Date Identified	Description	Contract Requirement (Spec. Section And Para. No., Drawing No. And Detail No., Etc.)	Action Taken by Qc Manager	Resolution	Date Completed

COMPLETION INSPECTION CHECKLIST

DATE: _____
MAJOR DEFINABLE FEATURE OF WORK: _____
LOCATION.: _____ SPEC SECTION: _____
(Refer to Final Follow-Up Inspection Checklist)

A. OPEN PUNCHLIST ITEMS FROM FINAL FOLLOW-UP INSPECTION CHECKLIST:

ITEM	DATE OF COMPLETION
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

B. NEW PUNCHLIST ITEMS NOTED:

ITEM	DATE OF COMPLETION
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

C. USACE QA NOTIFIED? Yes _____ No _____

On behalf of Tetra Tech FW, Inc., I certify this activity is completely in accordance with the Contract Documents, based upon the information available to me.

_____
Quality Control Manager

Attachment 6

Work Notification Forms

TERC CONTRACT NO.: *DACW45-94-D-0003* ***DELIVERY ORDER:*** *31*
PROJECT TITLE AND LOCATION: *Construction QA/QC Plan for LF-001, Kirtland AFB, NM*

VARIANCE REPORT

	Variance No.
	Linked w/NC No.: (if applicable)
	Date of Issue:
	Page ___ of ___
Project Name:	Project No.
- Variance Report -	
I. Summary of the Change: (by the person identifying the change)	
Identify by:	Date:
II. Variance Requested: (by the person identifying the change and the review committee:	
To be Performed by:	Date:
To be Performed by:	Date:
III. Justification for Variance: (by the review committee)	
IV. Applicable Document/Work Plan: (by the person identifying the change)	
Distribution List:	**- Signatures -**
	Requested by: Date:
	Approved by: Date:
	PM Approval: Date:
	QA Approval: Date:

TERC CONTRACT NO.: *DACW45-94-D-0003* ***DELIVERY ORDER:*** *31*
PROJECT TITLE AND LOCATION: *Construction QA/QC Plan for LF-001, Kirtland AFB, NM*

DESIGN CHANGE NOTICE

PROJECT	PROJ. NO.	DESIGN CHANGE NO.

TO _____ **DEPT.** _____ **LOCATION** _____ **DATE** _____

RE: ☐ DRAWING NO. _____ TITLE _____
☐ SPEC NO. _____ PAGE _____
☐ OTHER. ANTICIPATED REVISION DATE OF FORMAL DOCUMENTS

☐ ENGINEERING "HOLD" PLACED ON CONSTRUCTION ACTIVITIES IN AREA DEFINED HEREIN PENDING RECEIPT OF FORMALLY REVISED DOCUMENT(S) AND/OR REVISED DCN, PE SIGNATURE NOT REQUIRED.
☐ RELEASED FOR CONSTRUCTION ON BASIS OF MODIFICATION(S) PRESCRIBED BY THIS DCN.

APPLICABLE DOCUMENTS WILL BE REVISED BY:

☐ HOME OFFICE
☐ AS-BUILT DRAWING BY RESIDENT ENGINEER'S STAFF
☐ SITE (Project Engineer to assign Open Engineering Item No.) _____
☐ OTHER _____

PROPOSED CHANGE

DESCRIPTION

_____
_____
_____
_____
_____
_____

REASON FOR CHANGE

☐ FIELD CHANGE REQUEST (FCR No.) _____
☐ REQUIRED MODIFICATIONS TO DESIGN OR SPECIFICATION
☐ DISPOSITION OF NONCONFORMING ITEM
☐ CHANGES IN REGULATORY OR OTHER REQUIREMENTS
☐ OPERATIONAL EXPERIENCE
☐ OTHER _____

EXHIBITS ATTACHED ☐ **NO** ☐ **YES - IF YES, CHECK APPLICABLE BOX(ES)**
☐ COPIES OF MARKED-UP AREA OF DRAWING(S)
☐ FIELD CHANGE REQUEST (FCR No. _____)
☐ OTHER (Describe)_____

COMMENTS SCHEDULED ERECTED/PLACEMENT DATE(S)_____

ORIGINATOR_____ DATE_____

DISTRIBUTION (*Check as applicable and fill in name. Indicate with an asterisk (*) personnel who are to perform a QA review.)*

☐ Project Manager_____	☐ Health and Safety_____	☐ Chemical_____
☐ Project Engineer_____	☐ Construction_____	☐ Regulatory_____
☐ Architectural_____	☐ Electrical_____	☐ Structural_____
☐ CAD_____	☐ Environmental_____	☐ Science (Specify)_____
☐ Building_____	☐ I&C_____	☐ PQAE_____
☐ Mechanical_____	☐ Security_____	☐ Project Supt_____
☐ Process _____	☐ Estimating_____	☐ Vendor Supt_____
☐ Civil_____	☐ Quality Assurance_____	☐ Site Manager_____

NOTE: Personnel indicated with an asterisk (*) are to perform a QA review and inform Originator of any comments, or approve and sign, as applicable, by _____ (date).

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
NMED (Signature)	**DATE**	**KIRTLAND AFB PROJECT MANAGER (Signature)**	**DATE**

QA REVIEWER (if indicated above)
☐ COMMENTS (Attached) ☐ NO COMMENTS

SIGNATURE _____ DATE _____

PROJECT MANAGER (After acceptance of all reviews)

SIGNATURE _____ DATE _____

FIELD EVALUATION

☐ IMPLEMENT RECOMMENDED DISPOSITION ☐ DEFER RECOMMENDED DISPOSITION

RESIDENT ENGINEER (signature) _____ DATE _____

TERC CONTRACT NO.: *DACW45-94-D-0003* ***DELIVERY ORDER:*** *31*
PROJECT TITLE AND LOCATION: *Construction QA/QC Plan for LF-001, Kirtland AFB, NM*

NONCONFORMANCE REPORT

REPORT NO(1) _____

CLIENT OR PROJECT (2)		DRAWING NO/SPEC NO. (3)
SUPPLIER, CONSTRUCTION QC OR CONTRACTOR (4)	P. O. NO. (5)	
DESCRIPTION OF COMPONENT, PART OR SYSTEM (6)		

I. DESCRIPTION OF NONCONFORMANCE (7) *(Items involved, Specifications, Code or Standard to Which Items Do Not Comply, Submit Sketch (If Applicable)*

NAME AND SIGNATURE OF PERSON REPORTING NONCONFORMANCE (8)	TITLE/COMPANY	DATE (9)

II. RECOMMENDED DISPOSITION (10) *(Submit Sketch If Applicable)*

NAME AND SIGNATURE OF PERSON RECOMMENDING DISPOSITION (11)	TITLE/COMPANY	DATE (12)

III. EVALUATION OF DISPOSITION BY TETRA TECH FW, INC.. REASON OF DISPOSITION (13)

IV. CORRECTIVE ACTION (14) ☐ Required ☐ Not Required

V.(15) ☐ ENGINEERING	☐ QUALITY ASSURANCE	☐ CONSTRUCTION	☐ OTHER
NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)
DATE	DATE	DATE	DATE
☐ ACCEPTED ☐ REJECTED	☐ ACCEPTED ☐ REJECTED	☐ ACCEPTED ☐ REJECTED	☐ ACCEPTED ☐ REJECTED
☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED WITH COMMENTS

VI. VERIFICATION OF DISPOSITION ☐ REQUIRED ☐ NOT REQUIRED (16)
(17) BY _____ SIGNATURE_____ TITLE _____ DATE _____

TERC CONTRACT NO.: *DACW45-94-D-0003* ***DELIVERY ORDER:*** *31*
PROJECT TITLE AND LOCATION: *Construction QA/QC Plan for LF-001, Kirtland AFB, NM*

STOP WORK ORDER

REPORT NO(1) _____

CLIENT OR PROJECT (2)		DRAWING NO/SPEC NO. (3)
SUPPLIER, CONSTRUCTION QC OR CONTRACTOR (4)	P. O. NO. (5)	
DESCRIPTION OF COMPONENT, PART OR SYSTEM (6)		

I. DESCRIPTION OF STOP WORK NOTICE (7) *(Items involved, Specifications, Code or Standard to Which Items Do Not Comply, Submit Sketch (If Applicable)*

NAME AND SIGNATURE OF PERSON REPORTING STOP WORK NOTICE (8)	TITLE/COMPANY	DATE (9)

II.(15) ☐ ENGINEERING	☐ QUALITY ASSURANCE	☐ CONSTRUCTION	☐ OTHER
NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)
DATE	DATE	DATE	DATE
☐ ACCEPTED ☐ REJECTED	☐ ACCEPTED ☐ REJECTED	☐ ACCEPTED ☐ REJECTED	☐ ACCEPTED ☐ REJECTED
☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED WITH COMMENTS

III. VERIFICATION OF DISPOSITION ☐ REQUIRED ☐ NOT REQUIRED (16)
(17) BY _____ SIGNATURE_____ TITLE _____ DATE _____

Attachment 7

Miscellaneous Quality Control Forms

TERC CONTRACT NO.: *DACW45-94-D-0003* ***DELIVERY ORDER:*** *31*
PROJECT TITLE AND LOCATION: *Construction QA/QC Plan for LF-001, Kirtland AFB, NM*

PHOTOGRAPH LOG SHEET

Photographer _____

Date Submitted _____ **Roll No.** _____

Frame	Date	Time	Location/Grid No.	Description/Work No.	Notes
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
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32.					
33.					
34.					
35.					
36.					

TERC CONTRACT NO.: *DACW45-94-D-0003* ***DELIVERY ORDER:*** *31*
PROJECT TITLE AND LOCATION: *Construction QA/QC Plan for LF-001, Kirtland AFB, NM*

REQUEST FOR ENGINEERING INFORMATION (REI)

Sheet ___ of ___

REI No. Issue Date_____ Closure Date_____

Work Area:_____Subcontractor:_____

Applicable Plans, Drawings, Specifications:_____

Information Requested:_____

Subcontractor Signature: _____ Date:_____

Tetra Tech FW, Inc. Response:_____

Project Engineer Signature:_____ Date:_____

Project Manager Signature:_____ Date:_____

Distribution:

AFB Project Manager	CQC Systems Manager
DOM	Site Superintendent
Task Manager/Engineer	USACE QA
QCM	Subcontractor: _____

REQUEST FOR INFORMATION
(RFI)

Sheet ___ of ___

RFI No. Issue Date_____ Closure Date_____

Work Area:_____

Applicable Plans, Drawings, Specifications:_____

Information Requested:_____

Project Quality Control Manager Signature: _____ Date: _____

USACE QA Response:_____

USACE QA Signature:_____Date:_____

Distribution:

AFB Project Manager	CQC Systems Manager
DOM	Site Superintendent
Task Manager/Engineer	USACE QA
QCM	Subcontractor: _____

PROBLEM IDENTIFICATION CONSTRUCTION DEFICIENCY NOTICE

Sheet ___ of ___

DCN No. Issue Date_____ Closure Date_____

Work Area or Feature Inspected: _____ Deficient Subcontractor: _____

Applicable Plans, Drawings, Specifications:_____

Description of Deficient Condition:

Site Manager's Signature:_____ Date:_____

Recommended Disposition: _____

Recommender's Signature:_____Date:_____

Subcontractor Response:

Reinspection Required? Yes _____ No _____

Performed on _____

Acceptable? Yes _____ No _____

Distribution:

AFB Project Manager
DOM
Task Manager/Engineer
QCM
Site Superintendent
USACE QA
Subcontractor: _____

APPENDIX B

Stormwater Pollution Prevention Plan

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR INTERIM REMEDIAL ACTION–OPERATION NITRATE ABATEMENT PONDS (GOLF COURSE) REPAIR AT WP-026 AND ST-105 KIRTLAND AIR FORCE BASE, NEW MEXICO

September 2006

Prepared For
U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

Project No. MHMV 06-7037
Task Order 0003

Prepared By
Tetra Tech EC, Inc.
143 Union Boulevard, Suite 1010
Denver, Colorado 80228

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FIGURES

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
ft	foot/feet
GCMP	Golf Course Main Pond
HDPE	high-density polyethylene
IRA–O	Interim Remedial Action–Operation
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
PE	Professional Engineer
SHSO	Site Health and Safety Officer
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force

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1. INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) addresses the construction activities to repair and recondition the Golf Course nitrate abatement ponds under the Interim Remedial Action–Operation (IRA–O) at WP-026 and ST-105, Kirtland Air Force Base (AFB), New Mexico. This SWPPP describes the existing stormwater drainage conditions, the stormwater management and erosion control objectives, and the required maintenance and inspection procedures to be used during project activities.

1.1 Site Location and Description

A detailed description of the site is provided in Section 1 of the Work Plan. Figure B-1 depicts the location of the Tijeras Arroyo Golf Course, which contains the six nitrate abatement ponds (WP-026 and ST-105).

1.1.1 Site Description/Background

The Golf Course Main Pond (GCMP) and its five smaller ancillary ponds are part of the WP-026 and ST-105 Nitrate Abatement Program. A detailed map of the site is provided in Figure B-2. The ponds are used to capture and recover nitrate groundwater in the immediate area of the Golf Course. Water stored in the ponds is applied to the Golf Course via the site's irrigation system. It is highly likely that 1) the existing 40-mil high-density polyethylene (HDPE) liner installed at the GCMP has been compromised along the water line by tree growth, and 2) the 30-mil HDPE liners installed at four of the smaller ponds may have been compromised by excessive vegetation growth. Because of these conditions, there is a high probability that nitrate water has been discharged to the subsurface.

The GCMP is located in the northwestern portion of the Tijeras Arroyo Golf Course, between Fairways 3 and 4, approximately 100 feet (ft) east of the main golf course maintenance building. The Tijeras Arroyo Golf Course lies 3 miles south of the East Operations Area, northwest of the Manzano Base area and north of the riding stables. The five smaller ponds receive waters from the GCMP and are located throughout the Golf Course. Two ponds are due east of the GCMP and the smallest pond is immediately south of the GCMP. A fourth pond is located in the middle of the site and the fifth is in the southeastern portion of the Golf Course. The pond locations are illustrated on the detailed site map in Figure B-2. A photograph of nitrate abatement pond 5 shows the typical preconstruction condition of the ponds (Figure B-3).

1.2 Project Description

The main objective of this project is to repair over 600 lineal ft of HDPE liner system at the GCMP. The repair activities at the GCMP will consist of the following steps:

- Mobilization. The staging and loading area for HDPE liner and rock material will be established at the Golf Course maintenance building laydown area, in the northwestern portion of the site.
- Construct 1-ft-high berms around the GCMP if required to protect the construction area from stormwater runon from the surrounding areas.
- Drain pond to approximately 2 to 3 ft from the top of the headboard and relocate Koi. All water management and fish relocation will be performed by base/Golf Course personnel.
- Clear and grub excess vegetation.

- Repair the 40-mil HDPE liner.
- Replace riprap over exposed portions of the liner system.

Construction activities are also planned to recondition five small ponds at the Golf Course. Ponds 1 through 4 each cover approximately 0.5 acre, and pond 5 covers about 0.1 acre (approximately 2.1 acres total). Construction activities at the group of five smaller ponds will be conducted in the following steps:

- Construct 1-ft-high berms if required to protect the construction areas from stormwater runon. Silt fencing may be installed based on field conditions if necessary to prevent runoff from temporarily disturbed areas.
- Drain each pond as construction proceeds and relocate any Koi. All water management and fish relocation will be performed by base/Golf Course personnel.
- Clear and grub excess vegetation.
- Re-grade bottom surface and side slopes of ponds.
- Install new 40-mil HDPE liner in the four smaller ponds.
- Replace the liner system in the fifth pond with 40-mil HDPE.
- Place protective riprap along the pond surfaces and sidewalls. Backfill and compact anchor trenches and top with rounded riprap.
- Replace the below-grade fill lines in all five ponds with above-grade fill lines in order to remove the fill pipe liner penetrations.
- Demobilization.

A detailed description of these construction activities is provided in Section 2 of the Work Plan.

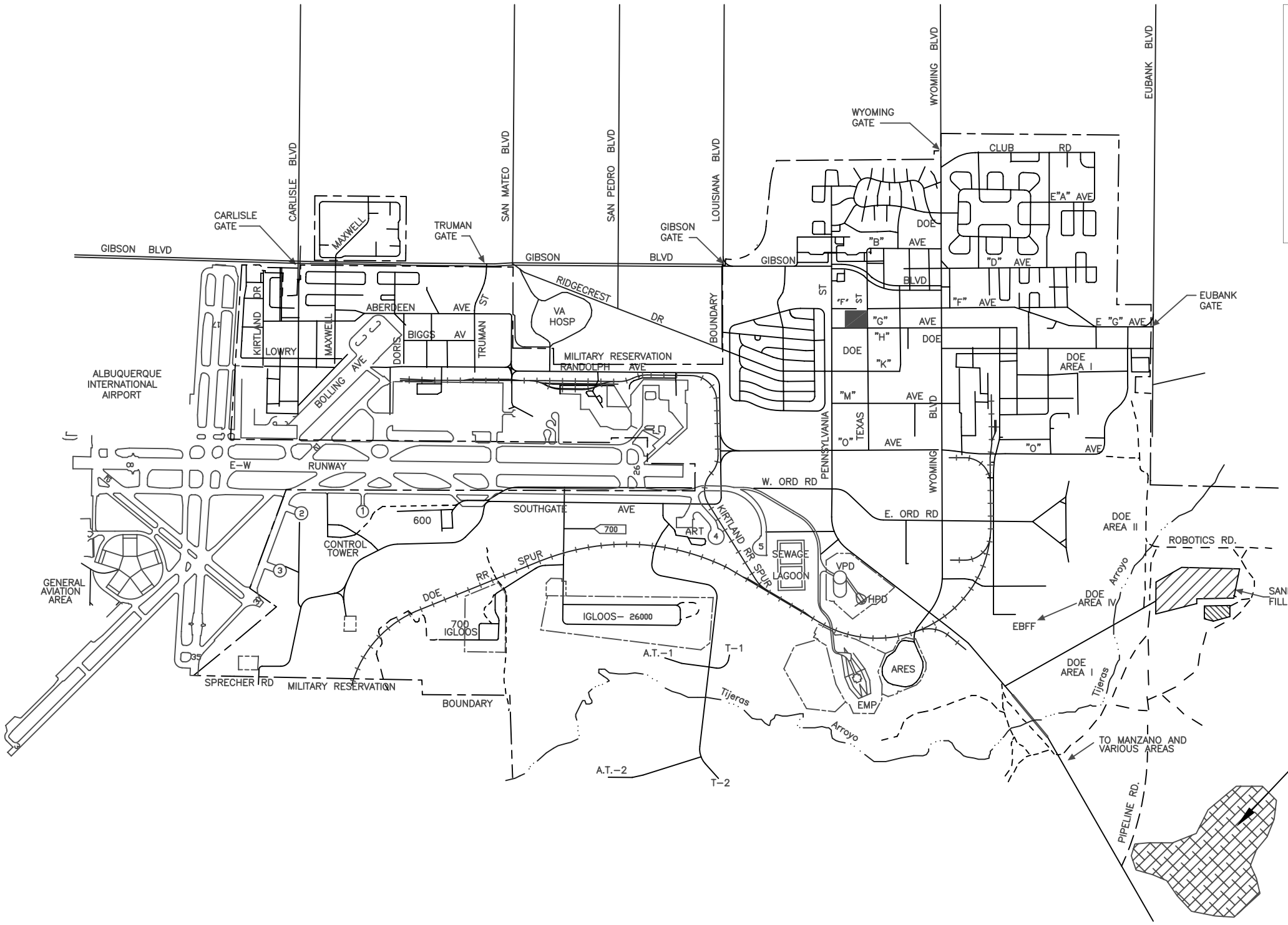
1.3 Purpose

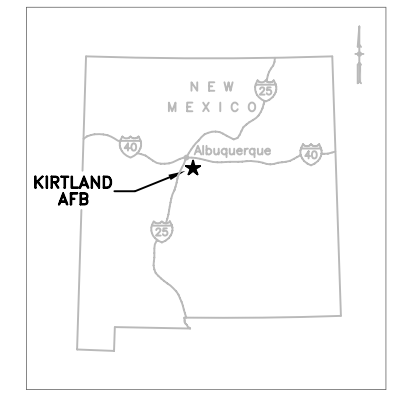
The goal of this SWPPP is to minimize the potential impacts on surface water quality that may result from construction activities at the Golf Course during the IRA–O. The SWPPP has been prepared in accordance with Best Management Practices (BMPs) provided in Attachment 1.

1.3.1 Regulatory Framework

In 1972, the U.S. Congress passed the Clean Water Act (CWA), which prohibits the discharge of any pollutants to waters of the United States from a point source unless that discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. The initial thrust to improve water quality under the NPDES focused on pollutant reduction in discharges of industrial process wastewater and municipal sewage. It has become evident that diffuse or nonpoint sources of water pollution are also major contributors to water quality degradation.

To improve the quality of stormwater discharges, Congress passed the Water Quality Act of 1987, which added a provision to the CWA directing the U.S. Environmental Protection Agency (EPA) to establish regulations for stormwater discharges under the NPDES. In 1990, EPA published final regulations that



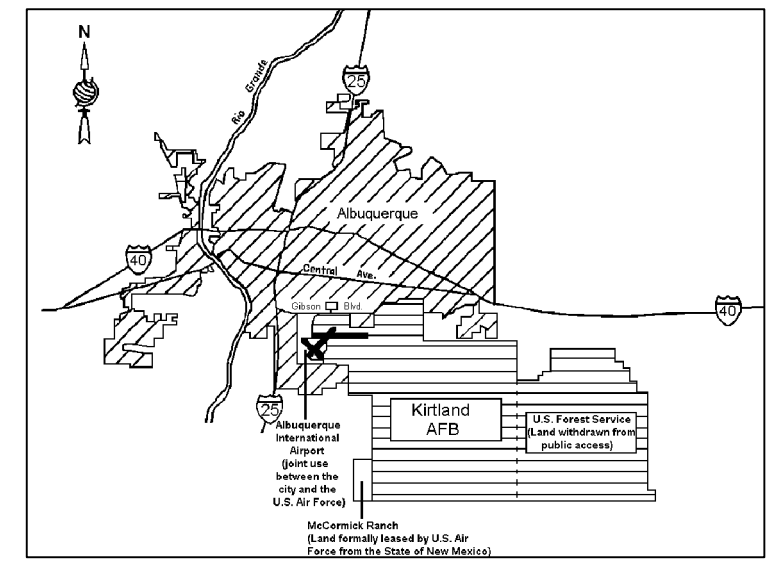


LEGEND

- KIRTLAND AFB PROPERTY BOUNDARY
- PROPERTY LEASED BY KIRTLAND AFB OR USED THROUGH OTHER AGREEMENT
- RAILROAD
- ROADS

0 1500 3000

1"=3000'
GRAPHIC SCALE



$$ – THINK VALUE ENGINEERING – $$

REVISIONS

SYMBOL	DESCRIPTIONS	DATE	APPROVED

TETRA TECH EC, INC.
ALBUQUERQUE, NM

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: JEA
REVIEWED BY: REV
SUBMITTED BY: JEA

KIRTLAND AFB, NEW MEXICO

IRA-O NITRATE ABATEMENT PONDS REPAIR LOCATION MAP

DESIGN FILE:
DATE: 09/19/06
SHEET NUMBER:
CONTRACT NO.:
Figure B-1
REVISION:

P:\Tulsa CEC\TO 03 - Kirtland AFB\Work Plans\DWG\GC Figure 1.dwg 9/19/2006 9:10:00 AM MDT

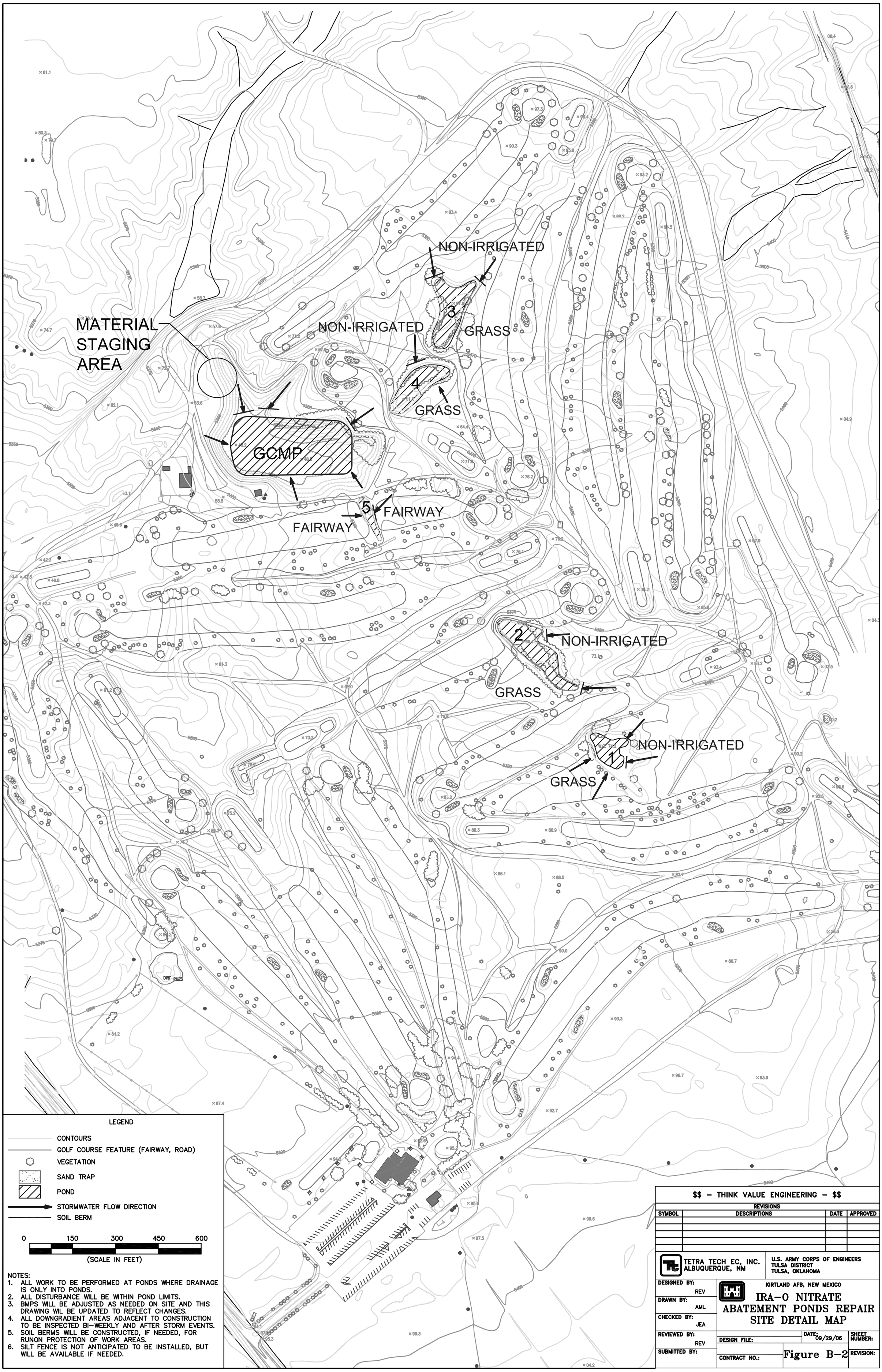

NON-IRRIGATED
3
GRASS
NON-IRRIGATED
MATERIAL STAGING AREA
4
GRASS
GCMP
5
FAIRWAY
FAIRWAY
2
NON-IRRIGATED
GRASS
NON-IRRIGATED
1
GRASS
DIRT PILES
LEGEND
CONTOURS
GOLF COURSE FEATURE (FAIRWAY, ROAD)
VEGETATION
SAND TRAP
POND
STORMWATER FLOW DIRECTION
SOIL BERM
0 150 300 450 600
(SCALE IN FEET)
NOTES:
1. ALL WORK TO BE PERFORMED AT PONDS WHERE DRAINAGE IS ONLY INTO PONDS.
2. ALL DISTURBANCE WILL BE WITHIN POND LIMITS.
3. BMPS WILL BE ADJUSTED AS NEEDED ON SITE AND THIS DRAWING WIL BE UPDATED TO REFLECT CHANGES.
4. ALL DOWNGRADIENT AREAS ADJACENT TO CONSTRUCTION TO BE INSPECTED BI-WEEKLY AND AFTER STORM EVENTS.
5. SOIL BERMS WILL BE CONSTRUCTED, IF NEEDED, FOR RUNON PROTECTION OF WORK AREAS.
6. SILT FENCE IS NOT ANTICIPATED TO BE INSTALLED, BUT WILL BE AVAILABLE IF NEEDED.
$$ – THINK VALUE ENGINEERING – $$
REVISIONS
SYMBOL | DESCRIPTIONS | DATE | APPROVED
TETRA TECH EC, INC.
ALBUQUERQUE, NM
U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
DESIGNED BY: REV
DRAWN BY: AML
CHECKED BY: JEA
REVIEWED BY: REV
SUBMITTED BY:
KIRTLAND AFB, NEW MEXICO
IRA-0 NITRATE
ABATEMENT PONDS REPAIR
SITE DETAIL MAP
DESIGN FILE:
DATE: 09/29/06
SHEET NUMBER:
CONTRACT NO.:
Figure B-2
REVISION:

Figure B-3. Pond #5 Looking South

establish permitting requirements for stormwater discharges associated with industrial activities. The regulations are provided in Title 40 of the Code of Federal Regulations (CFR) 122.26. This SWPPP was developed to be consistent with the EPA NPDES General Permit for Discharges from Large and Small Construction Activities, effective July 1, 2003, and modified effective January 21, 2005 (Attachment 2), and the New Mexico Environment Department Surface Water Quality Bureau Revised Storm Water Discharge Permit for Large and Small Construction Activities, dated March 4, 2004 (Attachment 3). The completed Notice of Intent for Stormwater Discharges Associated with Construction Activity under an NPDES General Permit is provided as Attachment 4.

1.3.2 Stormwater Pollution Prevention Plan Overview

This SWPPP identifies pollution sources on the site and describes the measures necessary to prevent or control discharges of potential stormwater pollutants in site stormwater runoff. The SWPPP also outlines site-specific BMPs that will be used to minimize the quantity of pollutants entering surface water. The provisions contained in this SWPPP shall be implemented as part of the conditions for the project-specific stormwater discharge permit. Although not a required component of the SWPPP under New Mexico provisions, a sediment control plan is presented in Section 3 that summarizes the types of temporary and permanent erosion and sediment control identified for the site.

A copy of the site-specific SWPPP and Base-Wide SWPPP (Attachment 5) will be kept at the project site. The plans shall be available upon request to authorized regulatory agency personnel.

1.4 Pollution Prevention Team

Specific members of the project team have responsibilities regarding stormwater management. These key onsite personnel are familiar with the site and the construction activities relating to the project. The project team includes personnel from management, safety, and construction. The team is responsible for the following activities:

- Implementing all SWPPP requirements
- Being aware of changes made during construction and determining whether any subsequent changes must be made to the SWPPP
- Overseeing routine materials inventory and recommending ways to minimize or eliminate hazardous materials
- Implementing and overseeing employee training and the inspection program
- Identifying potential pollutant sources and making recommendations to alleviate areas of potential stormwater concern
- Coordinating the implementation of BMPs, reviewing the effectiveness of the SWPPP, and updating the plan as necessary

The following key project personnel are assigned to the team:

John McBee	Quality Control System Manager	(505) 237-8440	Oversee spill prevention, preventative maintenance, and system material inventory
Rod Reese	Site Superintendent	(916) 996-4507	Supervise implementation of the SWPPP, inspections, and maintenance

2. POLLUTANT SOURCE ASSESSMENT

The SWPPP describes potential sources that may be reasonably expected to add significant amounts of pollutants to stormwater discharges or that may result in discharges of pollutants. Figure B-2, the site plan map for the construction area, identifies pollutant sources and helps in determining stormwater management opportunities.

The map and the assessment of pollutant sources facilitate the use of a risk-based approach by targeting the most important pollution sources that may require preventive and/or corrective action.

2.1 Site Assessment

Information about the environmental setting, including physical setting (physiography/topography and cultural geography), geologic setting (surface soils and geology), and hydrology (surface water and groundwater), is summarized in the *Interim Corrective Measure Report for Areas of Concern (AOC) Building 381 Spill Site (SS-79), Great Reusable Air Blast Simulator Site Waste Pile (WP-87), and Golf Course Main Pond (WP-026)* (USAF, 1999) and *Completion Report for the Golf Course Main Pond Repair Activities and Golf Course Production Well Redevelopment* (USAF, 2004a).

The GCMP and five smaller ancillary ponds are part of WP-026 and the ST-105 Nitrate Abatement Program. The GCMP is located in the northwestern portion of the Tijeras Arroyo Golf Course, between Fairways 3 and 4, approximately 100 ft east of the main golf course maintenance building. The Tijeras Arroyo Golf Course lies 3 miles south of the East Operations Area, northwest of the Manzano Base area and north of the riding stables.

Six surface water features, the nitrate abatement ponds, are located at the Golf Course. The pond locations and associated surface drainage patterns are illustrated on the detailed site map (Figure B-2). As described in Section 1-2, the planned construction activities are limited to the six pond areas. Figure B-3 shows the typical preconstruction condition of the ponds. As illustrated on the photograph of pond 5, surface water flows over vegetated ground into the ponds themselves, which occupy low areas of the Golf Course compared to the fairways.

While permanent surface water is present in the Golf Course ponds, the surface water system within the general Kirtland AFB area consists primarily of ephemeral streams or arroyos. The major surface drainages related to the Golf Course are the Tijeras Arroyo and Arroyo del Coyote. The Coyote del Arroyo discharges into the Tijeras Arroyo, which ultimately discharges into the Rio Grande.

2.2 Endangered Species and Historic Preservation Information

The U.S. Air Force (USAF) has determined that remedial actions conducted under the Environmental Restoration Program (ERP) are exempt from environmental assessments and other National Environmental Policy Act requirements due to the public participation inherent in the ERP. Cultural and natural resource requirements, however, are still applicable. As a result, a cultural resources survey was completed in January 1997 for all ERP sites at Kirtland AFB (USAF, 1997). In April 1995, the New Mexico Natural Heritage Program, University of New Mexico, released their Threatened and Endangered Species Survey of Kirtland AFB, New Mexico (USAF, 1995a), and in July 1995, Kirtland AFB published its Integrated Natural Resource Management Plan 1995–2000 (USAF, 1995b). Copies of these reports and plans are available for review at Kirtland AFB. These documents and surveys have identified no endangered species in the proximity of the GCMP, five smaller ancillary ponds, or the maintenance building.

2.3 Materials Inventory

The only significant materials to be stored onsite are HDPE liner and rock. These materials will be staged at the maintenance building laydown area (shown on Figure B-2) until used for pond repair or reconditioning. These materials do not have any potential to contribute pollutants to stormwater runoff. All materials related to equipment operation and maintenance will be managed at the appropriate area of the Golf Course maintenance facility. Hazardous wastes are not expected to be generated during construction activities.

Nonhazardous wastes generated during project activities may include trash and disposable personal protective equipment. All other construction debris will be loaded in dump trucks daily for disposal at LF-268 (Kirtland AFB Landfill) at the end of each day, or when the material had drained sufficiently to allow transport and disposal.

Methods and locations for the onsite storage and materials management practices used to minimize contact of these materials with stormwater are presented in the following subsections. Section 4 addresses BMPs.

2.3.1 Material Storage Area

There will be a single storage area for the HDPE liner and rock required for pond repair and reconditioning. The storage area will be located at the Golf Course maintenance facility laydown area (Figure B-2). These materials do not have the potential to contribute pollutants to stormwater runoff and do not require a liner or containment to be protected from stormwater runon and runoff.

2.3.2 Loading and Unloading Area

The greatest risk associated with management of the materials is during loading and unloading operations to and from the storage area. Loading and unloading will occur at the material storage area, but because of the nature of the materials stored, there is no potential risk of contributing pollutants to surface water. Nitrate groundwater will be managed by base/golf course personnel, who will drain the ponds to the extent required to facilitate repair and reconditioning activities.

2.3.3 Construction Areas

Construction activities will involve moving rock and HDPE liner. These materials are not susceptible to wind and water erosion.

2.4 Assessment Summary

There are no potential pollutant risks identified for construction activities at the Golf Course nitrate abatement ponds. Nitrate groundwater will be managed by Golf Course personnel, who will drain the ponds as required to facilitate construction activities.

3. SEDIMENT CONTROL PLAN

The purpose of the sediment control plan is to describe the types of temporary and permanent erosion and sediment control that will be available for use during construction activities, if required based on field conditions. The controls provide soil stabilization for disturbed areas and divert runoff.

Specifically, the NPDES General Permit requires that erosion and sediment controls for construction activities comply with the following criteria:

- Construction-phase erosion and sediment controls should be designed with the objective to retain sediment onsite.
- All control measures must be properly selected and installed in accordance with good engineering practices and manufacturer specifications.
- Offsite accumulations of sediment must be removed at a frequency to minimize impacts.
- Litter will be picked up prior to storm events or otherwise prevented from entering receiving water.

3.1 Site Conditions

The planned work activities involve repair and reconditioning of six nitrate abatement ponds at the Golf Course. Rock and rolls of HDPE liner will be staged at a material storage area located at the Golf Course maintenance laydown area. These materials have no potential to contribute pollutants to stormwater and are not susceptible to erosion from surface water runon or runoff. All debris produced as a result of construction at the individual ponds (vegetation from clearing and grubbing, excess rock, and waste liner) will be placed into dump trucks on a daily basis and disposed at LF-268 (Kirtland AFB Landfill). After the work is done, the ponds will be refilled with water, and runoff will not be an issue. Generation of excess clean soil after grading is not anticipated, and if generated, will be available for reuse at the base as fill.

Temporary and permanent erosion control BMPs will be used at the Golf Course as required to prevent or minimize the loss of soil from the land surface. The sediment control plan is directed toward permanent runon controls to protect the areas undergoing repair and reconditioning during and after construction and toward temporary runoff controls to prevent erosion of disturbed areas before site restoration. Construction at the GCMP will involve 1.85 acres, and at the five smaller ponds will affect a total of 2.1 acres.

To provide soil stabilization and prevent stormwater runon into the pond areas, the following temporary measures may be implemented, as applicable:

- Soil berms will be erected around the ponds, based on field conditions, to prevent silt from washing onto the construction sites. The measures will be in place prior to clearing and grubbing operations and remain until final stabilization of the site has been performed. Silt fencing will be available for use (BMPs ESC30, ESC50, and ESC52).
- Clearing and grubbing operations will be conducted only where required to preserve existing vegetation at the site, which serves as erosion control. (BMP ESC2)

To provide soil stabilization and prevent stormwater runon into the pond areas, the following permanent measures may be implemented, as applicable:

- Soil berms, approximately 1 ft high, will be erected as necessary around the perimeters of each of the ponds to prevent silt from washing onto the repaired/reconditioned ponds.
- Grading will be conducted to ensure the slope angles minimize flow velocity and erosion.
- Rounded riprap will be placed to prevent erosion once the liner installation and repairs are complete, all quality assurance/quality control testing has been performed, and the liner is accepted. A small windrow will be installed to prevent the riprap from slipping down the liner system.
- Disturbed areas will be reseeded using grass seed mixture provided or specified by the Golf Course (Attachment 6). Any reseeded areas will be irrigated as part of routine Golf Course operations.

To provide soil stabilization and divert stormwater runoff from disturbed areas, the following temporary measure may be implemented, as applicable:

- Silt fences will be available to prevent runoff and erosion of areas temporarily disturbed by construction activities. The silt fences, if required, will be implemented prior to clearing and grubbing activities and remain in place until final mobilization of the site has been performed.

3.2 Soil Loss Prevention

No modeling of potential soil loss at the nitrate abatement ponds was conducted because the ponds will not discharge to the surrounding area. It is unlikely that sediment will be discharged from any of the ponds given the post-construction conditions.

3.3 Contaminated Sediment Prevention Measures

Contaminated sediment prevention measures will be used to control pollutants in stormwater during and after construction. To prevent sediment contamination from affecting stormwater:

- All vehicles onsite will be inspected daily for leaks and will receive regular preventative maintenance to reduce the chance for leakage.
- Debris generated during construction will be loaded into dump trucks and transported to LF-268 (Kirtland AFB Landfill) at the end of each work day, or when the material has drained sufficiently to allow transport and disposal.
- Offsite tracking of sediments and generation of dust will be kept to a minimum.

3.4 Coordination of BMPs with Construction Activities

BMPs will be coordinated with construction activities so the BMP is in place before construction begins. The following will be coordinated with construction activities:

- Required temporary or permanent perimeter controls will be installed before clearing and grubbing.
- Clearing and grubbing or final grading will not occur in an area until necessary for construction to proceed.
- Temporary controls will not be removed until all construction and stabilization activities at the site are complete.

4. BEST MANAGEMENT PRACTICES

Operation and maintenance (O&M) BMPs (nonstructural) are the procedures, plans, and activities that prevent or reduce contact of potential pollutants with stormwater. Structural BMPs are the physical systems and protection measures that are constructed as part of the stormwater management and pollution protection system. A complete listing of applicable BMPs is provided as Attachment 1.

4.1 Nonstructural Best Management Practices

The following subsections describe nonstructural BMPs that will be used for stormwater management controls. Table B-1 provides a summary of the BMPs.

Table B-1. Summary of Nonstructural Best Management Practices for Onsite Construction Activities

Best Management Practices	Description of Activities
Good Housekeeping	Garbage and waste materials will be regularly picked up and disposed of properly.
Preventive Maintenance	Equipment and areas that have the potential for failures or spills will be identified.
	Regularly scheduled maintenance and repair of equipment will be performed.
	Equipment will be operated according to manufacturer's recommendations.
Visual Inspections	Regular housekeeping inspections will be conducted (weekly).
	Stormwater control structures will be inspected after each major storm event and, at a minimum, once a month and within 24 hours after each rainfall event.
	Monthly inspections of spill-response and fire-prevention equipment will be performed.
	Vehicles found to be leaking fluids will be repaired immediately.
	Vehicle maintenance and loading/unloading areas will be inspected for proper implementation of control measures.
Spill Prevention and Response	Proper material-transfer procedures will be used to reduce spills.
	Emergency spill-response equipment will be maintained at the site.
Employee Training	Employees will be trained on the components and goals of the SWPPP, spill prevention and response, good housekeeping procedures, material handling, and inspections.
Sediment and Erosion Control	Native vegetation will be disturbed to the least extent possible during project activities.
	Temporary berms and silt fencing will be used during construction.
	Riprap materials will be used during construction.
	Where appropriate, disturbed areas will be revegetated as soon as feasible after construction.
Record Keeping and Reporting	Spills and releases will be documented using the Health and Safety Incident Report.
	A separate record-keeping system will be implemented to document housekeeping and preventative maintenance inspections.
	Project records will be maintained in the construction trailer and become part of the project files.
Construction Sequencing	Construction will be sequenced to minimize amount and duration of soil exposure to wind, rain, runoff, and vehicle tracking, which can lead to erosion.

4.1.1 Good Housekeeping

Good housekeeping practices will help maintain a clean and orderly work environment. A clean work environment minimizes the possibility of accidental spills, which can be caused by mishandling chemicals or work equipment, and should reduce safety hazards to employees.

The following housekeeping measures are or will be implemented in an effort to prevent pollutants from entering stormwater discharges:

- *O&M practices:* Proper O&M practices help to ensure that equipment is working well, thus reducing the potential for spills and releases entering the environment.
- *Material inventory procedures:* Frequent training of personnel in good housekeeping techniques minimizes the potential for materials to be mishandled. Motivating employees to reduce spillage and minimize waste is an effective pollution-prevention technique.
- *Employee participation*: Involving site personnel in good housekeeping practices will include the following:
  - Discussing good housekeeping measures at daily tailgate safety meetings
  - Distributing information on good housekeeping practices during employee training sessions

Employees will be informed of activities that could lead to contamination of stormwater and the importance of carefully conducting these activities in areas that do not discharge into storm drainage areas.

4.1.2 Preventive Maintenance

Earthwork equipment and site vehicles must be maintained in good working condition. Preventive maintenance involves routine inspections and testing of equipment. Equipment will be maintained and inspected on a regular basis and according to the manufacturer's recommended practices.

4.1.3 Visual Inspections

Designated site personnel will conduct visual inspections. These employees will report to the pollution prevention team member responsible for inspections. Table B-2 provides a summary schedule of the various inspections that must be performed at the site.

Table B-2. Inspection Timing

Inspection	Minimum Frequency
Inspect construction equipment	Daily
Inspect material storage area	Weekly
Conduct housekeeping inspections	Weekly
Inspect stormwater structures	Bi-weekly and after 0.5 inches of rain
Inspect spill response equipment	Monthly
Inspect fire-prevention equipment	Monthly

The documentation of these inspections and maintenance of these records is described in Section 4.1.6.

4.1.4 Spill Prevention and Response

Suspended solids in stormwater runoff and from spills and leaks are the major cause of stormwater pollution. Based on drainage toward the ponds, the exposed materials (rock and HDPE liner), and site activities, the areas where construction-related spills are most likely to occur is at the material storage area when loading or unloading. However, the materials have no potential to contribute pollutants to stormwater and are not susceptible to erosion from surface water runon or runoff.

Activities related to vehicle and equipment maintenance will occur at the Golf Course maintenance facility in areas designated for this use, and are not part of this SWPPP. All project activities at the maintenance facility will be conducted in accordance with that facility's plans and procedures. However, general procedures to avoid spills and prevent stormwater contamination in the event of a spill at the maintenance facility are summarized below for reference.

The best way to manage a spill is to prevent it from happening. The following management procedures will be used to prevent a spill:

- Train personnel in proper materials management.
- Use tank/container filling and material transfer practices that reduce the probability of spills.
- Conduct regular visual inspections to identify tank/container problems and other potential spill indicators.

If a spill does occur in the maintenance facility and spill-prevention measures fail, site personnel will respond to prevent contamination of stormwater by implementing the procedures in place at the facility. In general, the following procedures will apply:

- Approach the spill from upwind to an area where the spill material can be identified.
- Shut down vehicles in the immediate area.
- Determine the source, type, and quantity of material spilled.
- After identifying and assessing the hazard, isolate and evacuate the area of impact based on an assessment of the quantity of material spilled and the resulting threat to life.
- Follow spill-reporting notification as indicated by Golf Course maintenance facility procedures.
- For large spills (more than 110 gallons):
  - Evacuate the area within 150 ft.
  - Follow spill-reporting notification as indicated in the Golf Course maintenance procedures.
  - Attempt to contain spilled material and prevent discharge outside of secondary containment; if not in a contained area, use available equipment to form a berm around the spill area.
  - For the cleanup of large spills, notify the Kirtland AFB Fire Department (505) 846-7948 and call the spill response pager, (505) 853-1603.

- For small spills (less than 110 gallons):
  - Move personnel out of the spill area.
  - Attempt to contain the spilled material.
  - Retain contaminated material in covered drums that are appropriately labeled and placed in a designated waste storage area.
  - Notify Kirtland AFB.

At a minimum, the following emergency spill equipment or equivalent should be available at the maintenance facility:

- Absorbent material
- Large drip pans
- A spark-resistant shovel
- A 55-gallon drum with bolt on lid
- Barricade tape
- Tyvek® suits
- Booties
- Gloves
- Safety goggles
- Warning tape or signs
- Fire extinguisher

4.1.5 Employee Training

An employee-training program will be implemented at the site to inform employees of the goals and components of the SWPPP. The training program will consist of informal training, including the following:

- Review of the Work Plan and associated plans contained within its appendices
- Review maintenance facility procedures as they apply to project activities
- Daily tailgate meetings covering stormwater pollution prevention techniques
- An on-site spill reporting coordinator who is trained on the proper reporting requirements per the Base-Wide Regulatory Compliance Plan (USAF, 2004)

4.1.6 Record Keeping and Reporting

Record keeping represents a good operating practice because it can increase the efficiency of site operations and the effectiveness of BMPs. A record-keeping system will help site personnel minimize incident recurrence, correctly respond to cleanup needs, and comply with regulatory requirements.

Spills and releases will be documented using Tetra Tech's Health and Safety Incident Report. The incident report will describe the quality and quantity of non-stormwater discharges from the site.

A separate record-keeping system has been established to document housekeeping and preventive maintenance inspections. All housekeeping and preventive maintenance inspections will be documented using the forms noted in Figures B-4 and B-5. Figure B-4 will be used to assess the required SWPPP components. Figure B-5 will be used for regular inspections of the current SWPPP components. The inspection sheets generally contain the following information:

- Date and time the inspection was performed
- Inspector's name and signature
- Items inspected
- Problems noted
- Corrective action required
- Date the corrective action was taken and a signature that the corrective action was completed

Other ways to document inspections include field notes, timed and dated photographs, and drawings and maps. All records shall be maintained in the construction trailer and become part of the project files.

4.1.7 Sediment and Erosion Control (Applicable BMPs—ESC2, ESC21, ESC30, ESC31, and ESC52—Attachment 1)

During construction activities, it is anticipated that a temporary storage area at the Golf Course maintenance building laydown area will be used to stage HDPE liner and rock prior to use at the ponds. No sediment or erosion control structures are required for the material storage area.

At the individual ponds, a 1-ft berm will be installed as required to protect the construction areas from stormwater runon. Silt fencing may be installed as required to prevent runoff and erosion of disturbed areas. Other potential BMPs may include drains or swales to divert runoff from the disturbed areas. The applicable BMPs are included in Attachment 1.

4.1.8 Construction Sequencing (Applicable BMP—ESC1—Attachment 1)

Construction sequencing, which is a BMP in itself, consists of phased construction activities, as outlined in the Work Plan. Construction will be sequenced to minimize the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Figure B-4. Erosion, Sediment, and Pollution Control Checklist

Inspector _____ Date _____

Area Inspected _____ Approximate Area _____

CONTAINED MATERIAL STATUS

Check that all material containers are intact and are not leaking and all containment elements are in place and in good condition.

- Diesel Fuel
- Lubricants
- Other _____

STABILIZATION PRACTICES

Stabilization practices will be initiated on all disturbed areas where construction activity will not occur for a period of more than 21 calendar days by the 14th day after construction activity has permanently or temporarily ceased. Stabilization measures to be used include:

- Silt Fencing
- Hay Bales
- Temporary Seeding
- Permanent Seeding
- Mulching
- Geotextiles
- Other _____

STRUCTURAL PRACTICES

Flows from upstream areas will be diverted from exposed soils. Measures to be used include:

- Earth Dike
- Drainage Swale
- Training Dike
- Other _____

DRAINAGE LOCATIONS SERVING LESS THAN 10 DISTURBED ACRES

- Sediment controls are needed and will include the following:
- Sediment basin
- Hay bales in anticipated drainage paths
- Silt fence along all sideslope and downslope boundaries

DRAINAGE LOCATIONS SERVING 10 OR MORE DISTURBED ACRES

- A sediment basin will be installed.
- A sediment basin cannot be constructed; the following sediment controls will be installed:
- Hay bales in anticipated drainage paths
- Silt fence along all sideslope and downslope boundaries

SEDIMENT BASIN RUNOFF STORAGE CALCULATION

_____ Acres area draining to the sediment basin

×

3.60 Cubic ft of storage/acre

=

_____ Cubic ft of storage required for the basin

Observed Conditions

_____

Changes required to the SWPPP _____

Figure B-5. Stormwater Pollution Prevention Plan Inspector Report

Inspector Report
Golf Course Main Pond (WP-026)
Kirtland Air Force Base, Bernalillo County, New Mexico

Inspector Name and Title:_____ Date:_____
Days Since Last Rainfall:_____ Amount of Rainfall:_____
(Contact base weather service 505-846-9707)

Erosion-Control Measures

1. Stabilized construction entrances:	Yes	No
• Does sediment get tracked onto aprons and road?		
• Is the gravel clean or filled with sediment?		
• Does all traffic use the construction entrances?		
Problems observed with the construction entrances:		

2. Silt fences (on soil):	Yes	No
• Is the bottom of the silt fence fabric buried?		
• Is the silt fence fabric in good condition?		
• Are the stakes intact?		
• How deep is the sediment at the silt fence?		
Problems observed with the silt fences:		
Maintenance required for the silt fences:		
Maintenance to be performed by (subcontractor name and date):		

3. Inlet protection barriers (on soil):	Yes	No
• Are straw bales intact?		
• Is the bottom of the straw bales buried?		
• How deep is the sediment at the barriers?		
Problems observed with the barriers:		
Maintenance required for the barriers:		
Maintenance to be performed by (subcontractor name and date):		

Figure B-5. Stormwater Pollution Prevention Plan Inspector Report (Concluded, page 2 of 2)

Inspector Report
Golf Course Main Pond (WP-026)
Kirtland Air Force Base, Bernalillo County, New Mexico

4. Inlet protection barriers or silt fences (on pavement):	Yes	No
• Are straw bales intact?		
• Are sandbags located adjacent to the bales?		
• Are sandbags pushed together, maximizing contact area at sandbag ends?		
• How deep is the sediment at the barriers/fences?		
Maintenance required for the barriers:		
Maintenance to be performed by (subcontractor name and date):		
Changes required to the Stormwater Pollution Prevention Plan (provide reason for each required change):		

Inspector's Name

Inspector's Signature

Date

The construction sequencing at the GCMP includes the following:

- Mobilization.
- Construct temporary runon/runoff erosion control measures.
- Drain pond to approximately 2 to 3 ft from the top of the headboard and relocate Koi. All water management and fish relocation will be performed by base/Golf Course personnel.
- Clearing and grubbing.
- Repair the 40-mil HDPE liner.
- Replace riprap over exposed portions of the liner system.
- Load excess debris into dump trucks for disposal at LF-268 at the end of each day, or when material has drained sufficiently to allow transport and disposal.

Construction activities are also planned to re-condition five small nitrate abatement ponds at the Golf Course. Ponds 1 through 4 cover approximately 0.5 acre each and pond 5 covers about 0.1 acre (2.1 acre total). Construction activities at the group of five smaller ponds will be conducted in the following steps:

- Construct temporary runon/runoff erosion control measures.
- Drain each pond as construction proceeds and relocate any Koi. All water management and fish relocation will be performed by base/Golf Course personnel.
- Clear and grub excess vegetation.
- Re-grade bottom surface and side slopes of ponds.
- Install new 40-mil HDPE liner in the four smaller ponds.
- Replace the liner system in the fifth pond with 40-mil HDPE.
- Place protective riprap along the pond surfaces and sidewalls. Backfill and compact anchor trenches and top with rounded riprap.
- Replace the below-grade fill lines in all five ponds with above-grade fill lines in order to remove the fill pipe liner penetrations.
- Load excess debris into dump trucks for disposal at LF-268 at the end of each day, or when material has drained sufficiently to allow transport and disposal.
- All disturbed areas will be reseeded as necessary with the same seed grass mixture currently used at the Golf Course. The reseeded areas will be irrigated using the Golf Course irrigation system.
- Demobilization.

4.2 Structural Best Management Practices

Based on the evaluation of potential pollution sources, structural BMPs will be necessary for the following:

- Construction areas and temporary material storage area
- Loading/unloading

The BMPs for each of these areas are described in the following sections.

4.2.1 Construction Areas (Applicable BMPs—ESC2, ESC10, ESC24, ESC41, and ESC50—Attachment 1)

In addition to the measures outlined in Section 4.1.7, the following controls will be applied to construction activities at the site.

- Silt fencing may be used, if required, as a sediment trapping and/or filtering device downgradient of all disturbed areas in the event sheet flow occurs. Silt fencing may be used at the following locations during construction:
  - Along the perimeter of individual ponds
  - Below other small cleared areas
- Berms (1 ft) will be used as necessary to protect the construction areas from runoff from the surrounding areas.
- Preservation of existing vegetation that does not interfere with liner operation. Minimizing unnecessary removal or injury of shrubs/bushes/grasses, will help to minimize surface disturbance and serve as erosion controls.

4.2.2 Loading/Unloading Area (Applicable BMP—CA10—Attachment 1)

In addition to the BMPs, precautions will be taken to prevent spills or releases during loading and unloading operations. Spill-control equipment will be available in the immediate vicinity of the maintenance operations in accordance with the procedures of the Golf Course maintenance facility.

4.2.3 Dust and Particulates (Applicable BMP—ESC 21—Attachment 1)

Dust-control measures, if implemented, will be used if required to stabilize soil from wind erosion and reduce dust generated from the following construction activities:

- Clearing and grading
- Construction vehicle traffic onsite
- Loading of construction debris

Dust-control measures, if implemented, will be the only non-rainfall discharge associated with this project. In addition to wet suppression, preventive measures to be used for dust control include minimizing surface areas to be disturbed and limiting on-site vehicular traffic to 15 miles per hour.

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5. WASTE MANAGEMENT

Tetra Tech will conduct waste management activities for waste vegetation from clearing and grubbing operations, waste (non-usable) riprap, waste liner material, and excavated waste soil from re-grading. The amount of generated wastes from this project will be minimized. The anticipated volume is a maximum of 2 ft of saturated soil over the five existing smaller pond surfaces in conjunction with the clearing and grubbing of the vegetation, and waste riprap from the GCMP. Non-degradable waste materials (rock and soil) will be recycled to the greatest extent practical.

It is anticipated that all debris generated as a result of construction activities at the ponds will be loaded into dump trucks and disposed at LF-268 at the end of each day, or when the material has drained sufficiently to allow transport and disposal. Hazardous materials or waste characterization is not expected.

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6. SWPPP REVISIONS AND MODIFICATIONS

This SWPPP will be amended if deemed necessary to address changes in the physical condition of the site or to maintain compliance in areas where the SWPPP is inadequate.

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7. CERTIFICATION OF STORMWATER POLLUTION PREVENTION PLAN FOR CONSTRUCTION ACTIVITIES

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Printed Name: Rod Reese

Signature: Ron Vinaw for Rod Reese

Title: Site Superintendent

Date: 9/29/06

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REFERENCES

USAF, 1995a. *Threatened and Endangered Species Survey,* Kirtland Air Force Base, New Mexico.

USAF, 1995b. *Integrated Natural Resource Management Plan 1995–2000,* Kirtland Air Force Base, New Mexico.

USAF, 2004a. *Completion Report for the Golf Course Main Pond Repair Activities and Golf Course Production Well Redevelopment.* Kirtland Air Force Base, New Mexico.

USAF, 2004b. *Final Base-Wide Plans for the Installation Restoration Program.* Kirtland Air Force Base, New Mexico.

USAF, 1999. *Interim Corrective Measure Report for Areas of Concern (AOC) Building 381 Spill Site (SS-79), Great Reusable Air Blast Simulator Site Waste Pile (WP-87), and Golf Course Main Pond (WP-026).* Kirtland Air Force Base, New Mexico.

USAF, 1997. *A Cultural Resources Survey of Installation Restoration Program Sites,* Kirtland Air Force Base, New Mexico.

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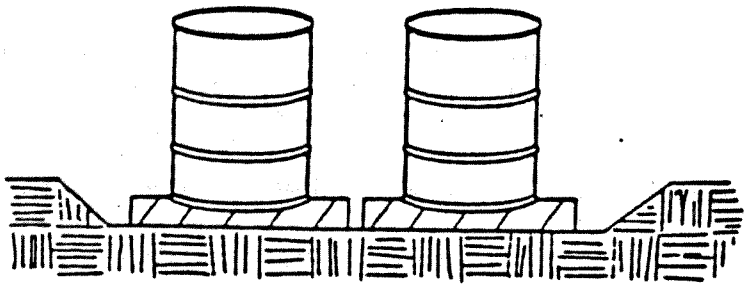
Attachment 1

Best Management Practices

ACTIVITY: MATERIAL DELIVERY AND STORAGE



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ◒ Sediment
- ◒ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ◒ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA10

Best Management Practices

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from material delivery and storage by minimizing the storage of hazardous materials on-site, storing materials in a 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 CA11 (Material Use), or CA12 (Spill Prevention and Control). For information on wastes, see the waste management BMPs in this chapter.

APPROACH

The following materials are commonly stored on construction sites:

- Soil,
- Pesticides and herbicides,
- Fertilizers,
- Detergents,
- Plaster or other products,
- Petroleum products such as fuel, oil, and grease, and
- Other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.

Storage of these materials on-site can pose the following risks:

- Storm water pollution,
- Injury to workers or visitors,
- Groundwater pollution, and
- Soil contamination.

Therefore, the following steps should be taken to minimize your risk:

- Designate areas of the construction site for material delivery and storage.
  - Place near the construction entrances, away from waterways
  - Avoid transport near drainage paths or waterways
  - Surround with earth berms (see ESC30, Earth Dike.)
  - Place in an area which 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.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.
- Keep an accurate, up-to-date inventory of materials delivered and stored on-site.
- Keep your inventory down.

- Minimize hazardous materials on-site storage.
- Handle hazardous materials as infrequently as possible.
- During the rainy season, consider storing materials in a covered area. Store materials in secondary containments such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, in secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids and to reduce corrosion.
- Try to keep chemicals in their original containers, and keep them well labeled.
- Train employees and subcontractors.
- Employees trained in emergency spill cleanup procedures should be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil (See CA22). If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

REQUIREMENTS

- Cost (Capital, O&M)
  - All of the above are low cost measures.
- Maintenance
  - Keep the designated storage area clean and well organized.
  - Conduct routine weekly inspections and check for external corrosion of material containers.
  - Keep an ample supply of spill cleanup materials near the storage area.

LIMITATIONS

- Storage sheds often must meet building and fire code requirements.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites; Flood Control District of Maricopa County, AZ, September 1992.

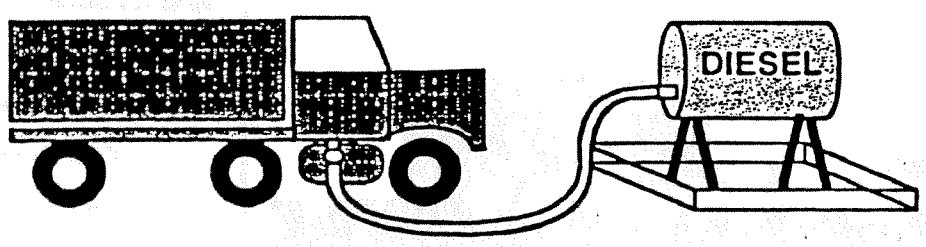
Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Storm Water Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA10

ACTIVITY: VEHICLE AND EQUIPMENT FUELING



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

DESCRIPTION

Prevent fuel spills and leaks, and reduce their impacts to storm water by using off-site facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors.

APPROACH

- Use off-site fueling stations as much as possible. Fueling vehicles and equipment outdoors or in areas where fuel may spill/leak onto paved surfaces or into drainage pathways can pollute storm water. If you fuel a large number of vehicles or pieces of equipment, consider using an off-site fueling station. These businesses are better equipped to handle fuel and spills properly. Performing this work off-site can also be economical by eliminating the need for a separate fueling area at your site.
- If fueling must occur on-site, use designated areas, located away from drainage courses, to prevent the runon of storm water and the runoff of spills.
- Discourage "topping-off" of fuel tanks.
- Always use secondary containment, such as a drain pan or drop cloth, when fueling to catch spills/leaks.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose of properly.
- Carry out all Federal and State requirements regarding stationary above ground storage tanks.
- 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 perhaps forklifts, 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.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

REQUIREMENTS

- Costs (Capital, O&M)
  - 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.
- Maintenance
  - Keep ample supplies of spill cleanup materials on-site.
  - Inspect fueling areas and storage tanks on a regular schedule.

LIMITATIONS

- Sending vehicles/equipment off-site should be done in conjunction with ESC24 (Stabilized Construction Entrance).

Targeted Pollutants

- ○ *Sediment*
- ○ *Nutrients*
- ◒ *Toxic Materials*
- ◒ *Oil & Grease*
- ○ *Floatable Materials*
- ○ *Other Construction Waste*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ○ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*
- ○ *Suitability for Slopes >5%*

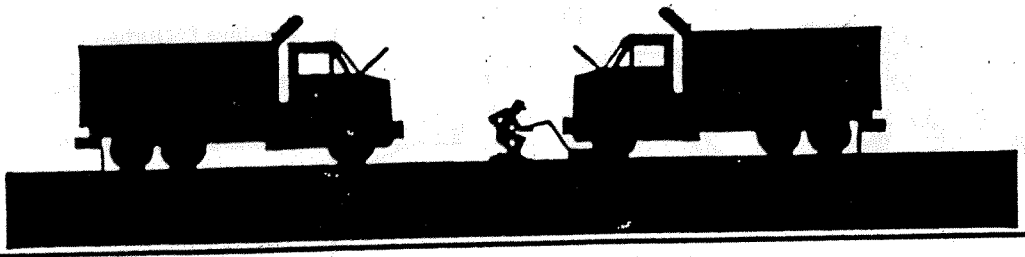
● *High* ○ *Low*

CA31

Best Management Practices

ACTIVITY: VEHICLE AND EQUIPMENT MAINTENANCE

Graphic: North Central Texas COG, 1993



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ○ Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA32

Best Management Practices

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment maintenance by running a "dry site". This involves using off-site facilities, performing work in designated areas only, providing cover for materials stored outside, checking for leaks and spills, containing and cleaning up spills immediately, and training employees and subcontractors.

APPROACH

- Keep vehicles and equipment clean, don't allow excessive build-up of oil and grease.
- Use off-site repair shops as much as possible. Maintaining vehicles and equipment outdoors or in areas where vehicle or equipment fluids may spill or leak onto the ground can pollute storm water. If you maintain a large number of vehicles or pieces of equipment, consider using an off-site repair shop. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work off-site can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur on-site, use designated areas, located away from drainage courses, to prevent the runon of storm water and the runoff of spills.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose of properly.
- Regularly inspect on-site 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 on-site.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

REQUIREMENTS

- Costs (Capital, O&M)
  - All of the above are low cost measures.
- Maintenance
  - Keep ample supplies of spill cleanup materials on-site.
  - Inspect maintenance areas on a regular schedule.

LIMITATIONS

- Sending vehicles/equipment off-site should be done in conjunction with ESC24 (Stabilized Construction Entrance).

Outdoor vehicle or equipment maintenance is a potentially significant source of storm water pollution. Activities that can contaminate storm water include engine repair and service, particularly changing or replacement of fluids, and outdoor equipment storage and parking (dripping engines). For further information on vehicle or equipment servicing, see CA30, Vehicle and Equipment Cleaning, and CA31, Vehicle and Equipment Fueling.

Listed below is further information if you must perform vehicle or equipment maintenance on-site.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, 1,1,1-trichloroethane, or methylene chloride. Many of these parts cleaners are harmful and 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 (1,1,1-trichloroethane, methylene chloride, etc.) with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check 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/Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (like 1,1,1-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.

Oil filters disposed of in trash cans or dumpsters can leak oil and contaminate storm water. 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 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.

Do not bury used tires.

REFERENCES

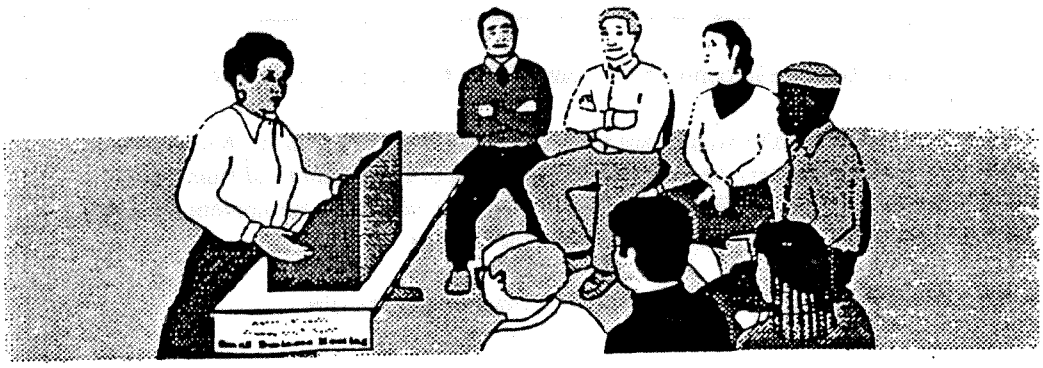
Best Management Practices and Erosion Control Manual for Construction Sites; Flood Control District of Maricopa County, AZ, September 1992.

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

CA32

ACTIVITY: EMPLOYEE/SUBCONTRACTOR TRAINING



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

DESCRIPTION

Employee/subcontractor training, like maintenance or a piece of equipment, is not so much a best management practice as it is a method by which to implement BMPs. This fact sheet highlights the importance of training and of integrating the elements of employee/subcontractor training from the individual source controls into a comprehensive training program as part of a company's Storm Water Pollution Prevention Plan (SWPPP).

The specific employee/subcontractor training aspects of each of the source controls are highlighted in the individual fact sheets. The focus of this fact sheet is more general, and includes the overall objectives and approach for assuring employee/subcontractor training in storm water pollution prevention. Accordingly, the organization of this fact sheet differs somewhat from the other fact sheets in this chapter.

OBJECTIVES

Employee/subcontractor training should be based on four objectives:

- Promote a clear identification and understanding of the problem, including activities with the potential to pollute storm water;
- Identify solutions (BMPs);
- Promote employee/subcontractor ownership of the problems and the solutions; and
- Integrate employee/subcontractor feedback into training and BMP implementation.

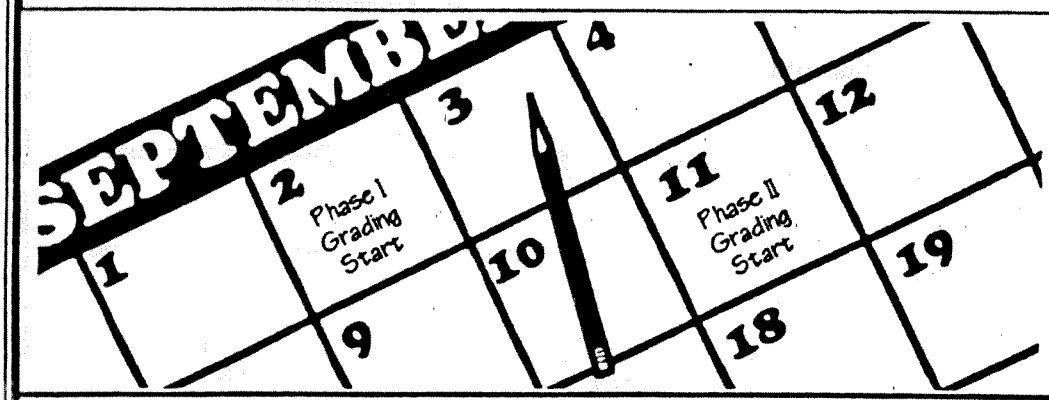
APPROACH

- Integrate training regarding storm water quality management with existing training programs that may be required for your business by other regulations such as: the Illness and Injury Prevention Program (IIPP) (SB 198) (California Code of Regulations Title 8, Section 3203), the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (29 CFR 1910.120), the Spill Prevention Control and Countermeasure (SPCC) Plan (40 CFR 112), and the Hazardous Materials Management Plan (Business Plan) (California Health and Safety Code, Section 6.95).
- Businesses, particularly smaller ones that may not be regulated by Federal, State, or local regulations, may use the information in this Handbook to develop a training program to reduce their potential to pollute storm water.
- Use the quick reference on disposal alternatives (Table 4.2) to train employee/subcontractors in proper and consistent methods for disposal.

CA40

Best Management Practices

BMP: SCHEDULING



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

DESCRIPTION

Sequencing the construction project to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

SUITABLE APPLICATIONS

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project. Use of other, more costly yet less effective, erosion and sedimentation controls, may often be reduced through proper construction sequencing.

APPROACH

- Project design considerations: Design project to integrate into existing land contours. Significant regrading of a site will require more costly erosion and sedimentation control measures and may require that on-site drainage facilities be installed.
- Incorporate existing, natural areas: Inventory and evaluate the existing site terrain and vegetation. Disturbance of highly erosive natural areas (e.g., steep, unstable slope areas, watercourses) should be minimized, while protecting other areas may enhance site aesthetics. Construction should not disturb these areas (see ESC2).
- Avoid rainy periods: Schedule major grading operations during dry months. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means (see ESC 10 to 24) or to install temporary sediment trapping devices (see ESC 50 to 56).
- Practice erosion and sediment control year round: Erosion may be caused during dry seasons by "freak" rainfall, wind and vehicle tracking. Therefore, keep the site stabilized year-round, and retain wet season sediment trapping devices.
- Minimize soil exposed at one time: Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding—revegetate cut and fill slopes as the work progresses.
- Trenching: Close and stabilize open trenches as soon as possible. Sequence trenching projects so that most open portions of the trench are closed before new trenching is begun.

REQUIREMENTS

- Cost
  - 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.

Targeted Pollutants

- ○ Sediment
- ○ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

ESC1

Best Management Practices

LIMITATIONS

There are no significant limitations to the use of this BMP.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona - 1992.

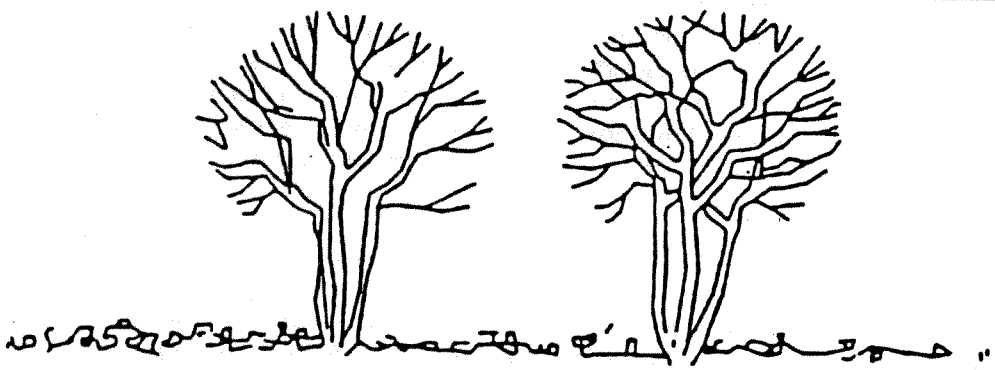
Erosion and Sediment Control Guidelines for Developing Areas in Texas, U.S. Department of Agriculture, Soil Conservation Service, Fort Worth, Texas - 1976.

Storm Water Management for Construction Activites. Developing Pollution Prevention Plans and Best Management Practices, U.S. Environmental Protection Agency, Office of Water (EPA 832-R-92-005) - September, 1992.

Virginia Erosion and Sediment Control Handbook, Third Edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation - 1992.

ESC1

BMP: PRESERVATION OF EXISTING VEGETATION



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

GENERAL DESCRIPTION

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs and/or grasses that serve as erosion controls.

SUITABLE APPLICATIONS

- Areas within site where no construction activity occurs, or occurs at a later date.
- Sensitive areas where natural vegetation exist and should be preserved, such as: steep slopes, watercourses, and building sites in wooded areas.
- Areas where local, state and federal government requires preservation, such as: vernal pools, wetlands, marshes, certain oak trees, etc.

INSTALLATION/APPLICATION CRITERIA

- Clearly mark, flag or fence vegetation or areas where vegetation should be preserved.
- Prepare landscaping plans which include as much existing vegetation as possible and state proper care of this vegetation both during and after construction.
- Define and protect with berms, fencing, signs, etc., a setback area from vegetation to be preserved. Setback area size should be based on the location, species, size, age and potential impact of adjacent construction activities or permanent improvements.
- Proposed landscaping plans which do not include plant species that compete with the existing vegetation.
- Do not locate construction traffic routes, spoil piles, etc., where significant adverse impact on existing vegetation may occur.

REQUIREMENTS

- Maintenance
  - Inspection and maintenance requirements for protection of vegetation are low.
  - During construction the limits of grading or disturbance should be clearly marked at all times.
  - Irrigation or maintenance of native trees or vegetation should conform to specifications on the Landscape Plan.
- Cost
  - There is little cost associated with preserving existing vegetation if properly planned during the project design, and may yield aesthetic benefits which enhance property values.

LIMITATIONS

- Requires forward planning by the owner/developer, contractor and design staff.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactorily for the planned development.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ○ Training
- ● Suitability for Slopes >5%

● High ○ Low

ESC2

Best Management Practices

Additional Information — Preservation of Existing Vegetation

The best way to prevent excessive erosion is to not disturb the land. On a construction site, where extensive land disturbance is necessary, a reasonable BMP would be to not disturb land in sensitive areas of the site which need not be altered for the project to be viable (e.g., natural watercourses, steep slopes), and to design the site to incorporate particularly unique or desireable existing vegetation into the site landscaping plan. Clearly marking and leaving a buffer area around these unique areas will both help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping in naturally vegetated areas.

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 insure the survival of desirable vegetation for shade, beautification, and erosion protection. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. Also, vegetation helps to 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.

The following criteria may be used for deciding which vegetation will remain on the site:

- Aesthetic values: Consideration should be given to foliage, flowering habits, bark and crown characteristics (for trees).
- Freedom from disease and rot.
- Life span of trees: Short-lived trees need not be preserved.
- Environmental values: Habitat; screening; and buffers.
- Sudden exposure: Save vegetation which grows in direct sunlight and is able to withstand radiated heat from proposed buildings and pavement.
- Space needed: Sufficient space must be provided between the vegetation and any structures, electric and telephone lines, water and sewer lines, driveways and streets. Mark trees and shrubs with bright paint or ribbon so there is no doubt as to which trees and shrubs are to be left and protected from damage during construction.

Saving existing vegetation and mature trees on-site, beautifies the area and may save money by reducing new landscaping requirements. Mature trees also increase property values and satisfy consumer aesthetic needs.

Preserving and protecting existing vegetation can often result in more stable soil conditions during construction. Careful site planning and identification of plantings to preserve can provide erosion and sedimentation controls during construction, and contribute to the aesthetics of the development. For example, in Sacramento County a tree ordinance has been adopted that protects the native California Oak tree. Provisions to protect the tree and its root system during construction must be specified in the project plans, and an area must be provided where the soil stability may not be disturbed. No grading or construction storage within the tree dripline is allowed.

Installation/Application

Building sites may be planned to integrate existing vegetation and trees. Construction impacts must be considered. Trench width for pipe construction projects and the location of permanent structures, such as buildings, needs to be considered when preserving existing vegetation, including mature trees and their root system. Native vegetation should be preserved since it is able to adapt to the climate. The USDA Soil Conservation Service should be contacted about existing vegetation for sites throughout California. Mature trees are generally preferable to newly planted trees because of the greater soil stabilization provided by the extensive root system of a mature tree.

ESC2

Best Management Practices

Additional Information — Preservation of Existing Vegetation

Methods for protecting existing vegetation and trees:

- Stake off root system limits (drip line of tree). Some counties limit construction within 5 feet of the tree drip line.
- Fence off the area to be preserved or along the tree drip line.
- Flag or mark trees to remain in place.
- Tree wells and retaining walls (permanent) help preserve existing vegetation, but must be large enough to protect the root system (see below).
- For the California Oak tree, no trenching or irrigation should be allowed within the driplines of the tree, since both these activities are detrimental to the preservation of the tree.
- Where grading under trees is necessary, excavation and fill should be limited to 1 foot within the driplines.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

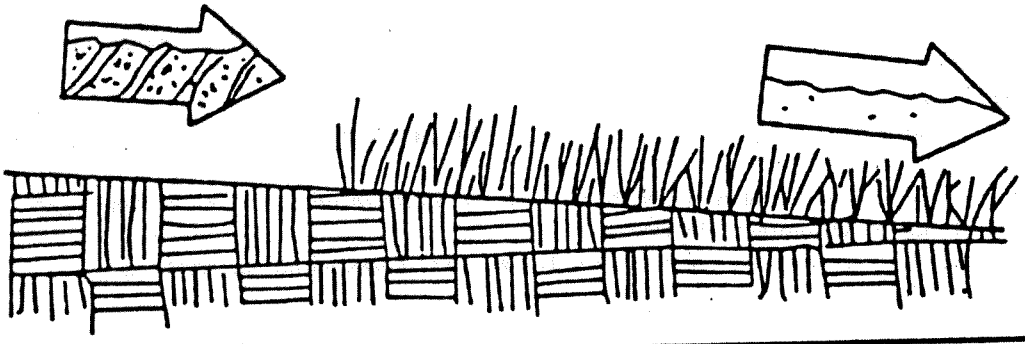
County of Sacramento Tree Preservation Ordinance - September 1981.

Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual - February 1992, Publication # 91-75.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

ESC2

BMP: SEEDING AND PLANTING



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ● Sediment
- ◒ Nutrients
- ◒ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ◒ O&M Costs
- ◒ Maintenance
- ◒ Training
- ◒ Suitability for Slopes >5%

● High ○ Low

ESC10

Best Management Practices

GENERAL DESCRIPTION

Seeding of grasses and plantings of trees, shrubs, vines and ground covers provide long-term stabilization of soil. In some areas, with suitable climates, grasses can be planted for temporary stabilization.

SUITABLE APPLICATIONS

- Appropriate for site stabilization both during construction and post-construction.
- Any graded/cleared areas where construction activities have ceased.
- Open space cut and fill areas.
- Steep slopes.
- Spoil piles.
- Vegetated swales.
- Landscape corridors.
- Stream banks.

INSTALLATION/APPLICATION CRITERIA

Type of vegetation, site and seedbed preparation, planting time, fertilization and water requirements should be considered for each application.

Grasses:

- Ground preparation: fertilize and mechanically stabilize the soil.
- Tolerant of short-term temperature extremes and waterlogged soil conditions.
- Appropriate soil conditions: shallow soil base, good drainage, slope 2:1 or flatter.
- Develop well and quickly from seeds.
- Mowing, irrigating, and fertilizing are vital for promoting vigorous grass growth.

Trees and Shrubs:

- Selection Criteria: vigor, species, size, shape & wildlife food source.
- Soil conditions: select species appropriate for soil,drainage & acidity.
- Other Factors: wind/exposure, temperature extremes, and irrigation needs.

Vines and Ground Covers:

- Ground preparation: lime and fertilizer preparation.
- Use proper seeding rates.
- Appropriate soil conditions: drainage, acidity, slopes.
- Generally avoid species requiring irrigation.

REQUIREMENTS

- Maintenance
  - Shrubs and trees must be adequately watered and fertilized and if needed pruned.
  - Grasses may need to be watered and mowed.
- Cost: Average annual cost for installation and maintenance (2-year useful life, source: EPA, 1992)
  - Seeding: $300 per acre, appropriate for flat slopes and stable soils.
  - Seeding with Mulching: $1,100 per acre, appropriate for moderate to steep slopes and/or erosive soils.
  - Trees, shrubs, vines, and ground cover: Cost, applicability based on species used and terrain features.

LIMITATIONS

- Permanent and temporary vegetation may not be appropriate in dry periods without irrigation.
- Fertilizer requirements may have potential to create storm water pollution if improperly applied.

ESC10

Additional Information — Seeding and Planting

Permanent seeding of grasses, sodding, and planting of trees, shrubs, vines and ground covers can provide long-term stabilization of soil. Permanent seeding and planting contributes to long-term site aesthetics and helps reduce erosion by reducing the velocity of runoff, allowing infiltration to occur, filtering sediments, and by holding soil particles in place.

Seeding and planting should be applied as soon as final grading is done to all graded and cleared areas of the construction site where plant cover is ultimately desired. For example, vegetation may be established along landscaped corridors and buffer zones where they may act as filter strips (see TC6 in Chapter 5 of the Municipal Handbook). Additionally, vegetated swales, steep and/or rocky slopes and stream banks can also serve as appropriate areas for seeding and plantings.

Installation/Application Criteria

Application of appropriate vegetation must consider: the seedbed or plantbed, proper seasonal planting times, water requirements fertilizer requirements and availability of the selected vegetation within the project's region. Permanent plantings during the construction stage of projects require careful coordination between the local agency inspectors, project managers, construction managers, and landscape contractor. Protocols for coordination and implementation procedures regarding site access, construction staging, and short- and long-term planting areas should be developed prior to the construction bid process. Where possible, these protocols should be established by and remain the responsibility of the site owner.

Because of the many available types of plants and ground covers and because site conditions and land use vary so widely within California, a set of general guidelines is included for installation/application of grasses, trees and shrubs, vines and ground covers. However, your local municipality, Soil Conservation Service, agricultural extention, or other resources should be consulted on appropriate species, planting requirements, and maintenance needs for your climate and soils.

Grasses

Grasses, depending on the type, provide short-term soil stabilization during construction or can serve as long- term/ permanent soil stabilization for disturbed areas. In general, grasses provide low maintenance to areas that have been cleared, graded and mechanically stabilized.

Selection:

The selection of the grass type is determined by the climate, irrigation, mowing frequency, maintenance effort and soil-bed conditions. Although grasses provide quick germination and rapid growth, they also have a shallow root system and are not as effective in stabilizing deep soils, where trees, shrubs and deep rooted ground covers may be more appropriate. Several grasses are adaptable to the various California climates. The figure at the end of these fact sheets shows appropriate grasses for regions within California. Blue grass is well adapted throughout California except for in the valley regions. The blue grass is found on dry, sandy soils that have good drainage. Bermuda grass, on the other hand is well adapted in the valley region where soils are dry, coarse and heavier. Specific seed mix and/or varieties for each site should be provided by an approved/qualified plant materials specialist.

ESC10

Additional Information — Seeding and Planting

Planting:
The following steps should be followed to ensure established growth:

1. Select the proper grass for the site.
2. Prepare the seedbed; soil should be fertilized and contain good topsoil or soil at least a 2:1 or flatter slope.
3. Broadcast the seedings in the late fall or early spring. In the late fall, seedings should be planted by mid- September to have established grass by the October rainy season.
4. Initial irrigation will be required often for most grasses, with follow-up irrigation and fertilization as needed. Mulching may be required in dry climates or during drought years.

Trees & Shrubs

Selection:
Trees and shrubs, when properly selected, are low maintenance plantings that stabilize adjacent soils, moderate the adjacent temperatures, filter air pollutants, and serve as a barrier to wind. Some desirable characteristics to consider in selecting trees and shrubs include: vigor, species, age, size and shape, and use as a wildlife food source and habitat.

Trees and shrubs to be saved should be clearly marked so that no construction activity will take place within the dripline of the plant. The sites for new plantings should be evaluated. Consider the prior use of the land: adverse soil conditions such as poor drainage or acidity; exposure to wind; temperature extremes; location of utilities, paved areas, and security lighting and traffic problems.

Transplanting:
Time of Year - Late fall through winter (November to February) is the preferred time for transplanting in most of California.

Preparation - Proper digging of a tree/shrub includes the conservation of as much of the root system as possible. Soil adhering to the roots should be damp when the tree is dug, and kept moist until re-planting. The soil ball should be 12 inches in diameter for each inch of diameter of the trunk.

Site preparation - Refer to landscape plans and specifications for site and soil preparation, and for ability to coordinate construction strategy with permanent vegetation.

Supporting the trunk - Many newly planted trees/shrubs need artificial support to prevent excessive swaying.

Watering - Soil around the tree should be thoroughly watered after the tree is set in place. When the soil becomes dry, the tree should be watered deeply, but not often. Mulching around the base of the tree is helpful in preventing roots from drying out.

Vines & Ground Covers

Selection:
Vines, ground covers, and low growing plants, that can quickly spread, come in many types, colors, and growth habits. Some are suitable only as part of a small maintained landscape area, while some can stabilize large areas with little maintenance. Flowers, which provide little long-term erosion control may be planted to add color and varietal appearances.

ESC10

Caution should be exercised in the non-native vegetation because of impacts to native vegetation on adjacent lands. For example, species that may be planted at the construction site can quickly spread and compete with originally undisturbed vegetation such as the California Poppy and California buckwheat, both of which complete poorly with introduced grasses (e.g., planting wild oats is illegal in California). In addition to stabilizing disturbed soil, vines and ground covers can perform the following functions:

1. Provide attractive cover that does not need mowing.
2. Help to define traffic areas and control pedestrian movement.

Site Preparation:
Ground covers are plants that naturally grow very close together, causing severe competition for space nutrients and water. Soil for ground covers should be well prepared. The entire area should be spaded, disced, or rototilled to a depth of six to eight inches. Two to three inches of organic material, such as good topsoil or peat, should be spread over the entire area.

Planting:
The following steps will help ensure good plant growth.

1. Make the plantings following the contours of the land.
2. Dig the holes 1/3 larger than the plant root ball.
3. Know what depth to place the plants.
4. Use good topsoil or soil mixture with a lot of organic matter.
5. Fill hole 1/3 to 1/2 full, shake plants to settle soil among roots, then water.
6. Leave saucer-shaped depression around the plant to hold water.
7. Water thoroughly and regularly.
8. Space plants according to the type of plant and the extent of covering desired.

Materials:
There are many different species of vines and ground covers from which to choose, but care must be taken in their selection. It is essential to select planting materials suited to both the intended use and specific site characteristics. The plants discussed in this handbook are those which are known to be adapted to California, and commonly available from commercial nurseries. Additional information can be obtained from local nurserymen, landscape architects, and extension agents. An approved low water use plant list may be obtained from the State Department of Water Resources or the Soils Conservation Service.

Requirements
Maintenance

General requirements include:

- Grass maintenance should be minimal to none. Irrigation and regular fertilizing may be required for some types of grasses. Mowing is only required in areas where aesthetics or fire hazards are a concern.
- Young trees should receive an inch of water each week for the first two years after planting. The tree should be watered deeply, but not more often than once per week.
- Transplanted trees should be fertilized on an annual basis.
- Proper pruning, watering, and application of fertilizer is necessary to maintain healthy and vigorous shrubs. A heavy layer of mulch applied around the shrubs reduces weeds and retains moisture.
- Trim old growth as needed to improve the appearance of ground covers. Most covers need once-a-year trimming to promote growth.

ESC10

Additional Information — Seeding and Planting

Limitations

- Construction activities are likely to injure or kill trees unless adequate protective measures are taken. Direct contact by equipment is the most obvious problem, but damage is also caused by root stress from filling, excavation, or compacting too close to trees.
- Temporary seeding can only be viable when adequate time is available for plants to grow and establish.
- Over fertilizing of plants may cause pollution of storm water runoff.
- Irrigation source and supply may be limiting.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, September 1992.

"Draft - Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

Guides for Erosion and Sediment Controls in California, USDA Soils Conservation Service - January 1991.

Kiowa Engineering, Interim Erosion and Sedimentation Control for Construction Activities, Urban Drainage and Flood Control District, Denver, Colorado.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, Jun 1981.

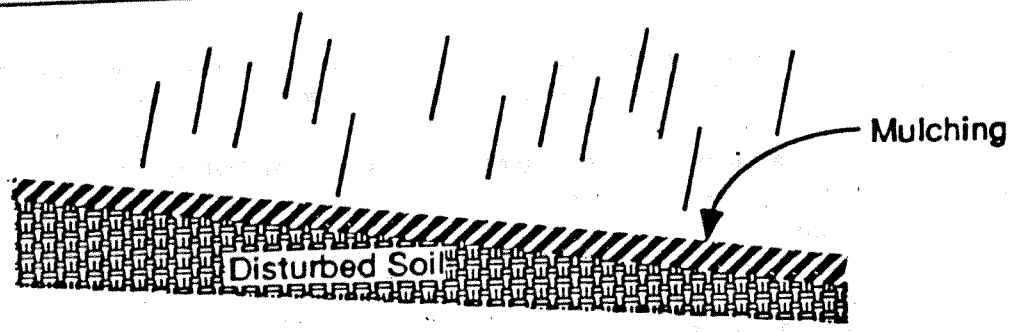
Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April, 1992.

Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual - February 1992, Publication # 91-75.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices. Tahoe Regional Planning Agency - November 1988.

ESC10

BMP: MULCHING



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ● Sediment
- ◒ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ◒ O&M Costs
- ◒ Maintenance
- ○ Training
- ● Suitability for Slopes >5%

● High ○ Low

GENERAL DESCRIPTION

Mulching is used to temporarily and permanently stabilize cleared or freshly seeded areas. Types of mulches include organic materials, straw, wood chips, bark or other wood fibers, decomposed granite, and gravel.

SUITABLE APPLICATIONS

- Temporary stabilization of freshly seeded and planted areas.
- Temporary stabilization during periods unsuitable for growing vegetation.
- Temporary stabilization of areas that cannot be seeded or planted (e.g., insufficient rain, steep slope).
- Mulches such as gravel and decomposed soils may be used as post-construction BMPs, particularly in arid regions.

INSTALLATION/APPLICATION CRITERIA

Mulch prevents erosion by protecting the soil surface and fostering growth of new seedings that do not stabilize by themselves.

- May be used with netting to supplement soil stabilization.
- Apply to planting areas where slopes are 2:1 or greater.
- Binders may be required for steep areas, or if wind and runoff is a problem.
- Type of mulch, binders, and application rates should be recommended by manufacturer/contractor.

REQUIREMENTS

- Maintenance
  - Must be inspected weekly and after rain for damage or deterioration.
- Cost: Average annual cost for installation and maintenance (3-4 month useful life, source: EPA, 1992)
  - Straw Mulch: $7,500 per acre.
  - Wood Fiber Mulch: $3,500 per acre.
  - Jute Netting: $12,500 per acre.

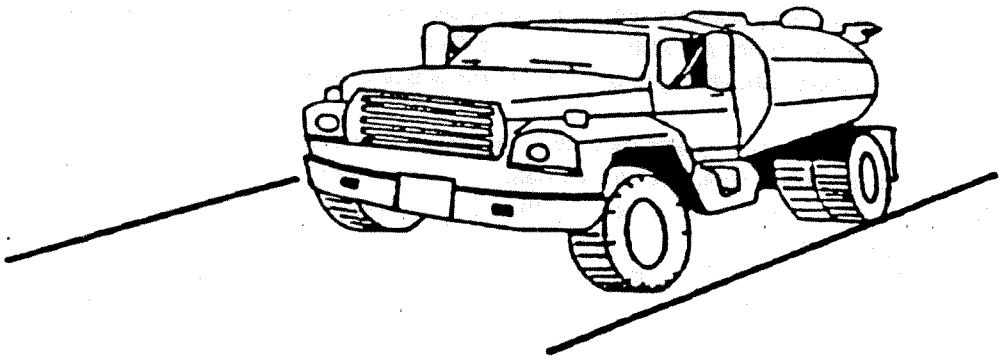
LIMITATIONS

- Wood fiber mulches should be used only in areas with over 20 inches annual precipitation.
- Organic mulches are not permanent erosion control measures.
- Mulches tend to lower the soil surface temperature, and may delay germination of some seeds.
- Permanent mulches for arid regions should include gravel and decomposed soils.

ESC11

Best Management Practices

BMP: DUST CONTROLS



Objectives

- (Housekeeping Practices)
- Contain Waste
- (Minimize Disturbed Areas)
- (Stabilize Disturbed Areas)
- Protect Slopes/Channels
- (Control Site Perimeter)
- Control Internal Erosion

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ◒ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

ESC21

Best Management Practices

GENERAL DESCRIPTION

Dust control measures are used to stabilize soil from wind erosion, and reduce dust generated by construction activities.

SUITABLE APPLICATIONS

- Clearing and grading activities.
- Construction vehicle traffic on unpaved roads.
- Drilling and blasting activities.
- Sediment tracking onto paved roads.
- Soil and debris storage piles.
- Batch drop from front end loaders.
- Areas with unstabilized soil.
- Final grading/site stabilization usually is sufficient to control post-construction dust sources.

INSTALLATION/APPLICATION CRITERIA

- Schedule construction activities to minimize exposed area (See ESC 1).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering (See ESC 10 and 11).
- Identify and stabilize key access points prior to commencement of construction (See ESC 24).
- Minimizing the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site (See ESC 23).

REQUIREMENTS

- Maintenance
  - Most dust control measures require frequent, often daily, attention.
- Cost
  - Installation costs for water/chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

LIMITATIONS

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Overwatering may cause erosion.
- Oil should not be used for dust control because the oil may migrate into drainageway and/or seep into the soil.
- Certain chemically-treated subgrades may make soil water repellant, increasing runoff.

Additional Information — Dust Controls

California's mediterranean climate, with short wet seasons and long hot dry seasons, allow the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbance and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast and Sacramento, among others have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line. Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). 90% of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and/or public health departments are in place in some regions within California. For jurisdictions that have no formal dust control regulations and/or standards, Sections 10, 17 and 18 of CalTrans' Standard Specifications provide detailed provisions for dust control practices.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction & Grading Permits: Require provisions for dust control plans;
- Opacity Emission Limits: Enforce compliance with California air pollution control laws;
- Increase overall enforcement activities: Priority given to cases involving citizen complaints;
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMP's generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. Table ESC21.1 shows which Dust Control BMPs apply to site conditions which cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel or 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 and sand fences can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting on-site vehicle traffic to 15 miles per hour, and controlling the number and activity of vehicles on a site at any given time.

Many of the reasonably available control measures for controlling dust from construction sites can also be implemented as BMPs for storm water pollution prevention. Those BMPs include:

- Pave, vegetate, 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 wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean-up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize unpaved haul roads, parking and staging areas. Reduce speed and trips on unpaved roads.
- Implement dust control measures for material stockpiles.
- Prevent drainage of sediment laden storm water onto paved surfaces.
- Stabilize abandoned construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For the chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. The types of chemicals available and recommendations for their use are tabulated in Table ESC 21.2, Commonly Used Chemicals for Dust Control.

ESC21

Additional Information — Dust Controls

In addition, there are many other BMPs identified in this handbook that provide dust control including:

- Seeding and Plantings (ESC 10)
- Mulching (ESC 11)
- Construction Road Stabilization (ESC 23)
- Stabilized Construction Entrances (ESC 24)

Limitations

- Oil treated subgrades should not be used because the oil may migrate into drainageways and/or seep into the soil.
- 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.
- Asphalt, as a mulch tack or chemical mulch, requires a 24 hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

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, 1992.

CalTrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

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.

Sacramento County, Winterization Ordinance & Dust Control Ordinance (example).

USDA Soil Conservation Service, "Guides for Erosion and Sediment Control".

ESC21

TABLE ESC 21.1 DUST CONTROL BMPs FOR GIVEN SITE CONDITIONS

SITE CONDITION	DUST CONTROL BMPs								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt Surfacing	Sand Fences	Temporary Gravel Construction Entrances/Equipment Wash Down	Haul Truck Covers	Minimize Extent of Area Disturbed
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X				X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/Excavation			X	X					X
Truck Traffic on Unpaved Roads			X	X	X			X	
Mud/Dirt Carry-Out					X		X		

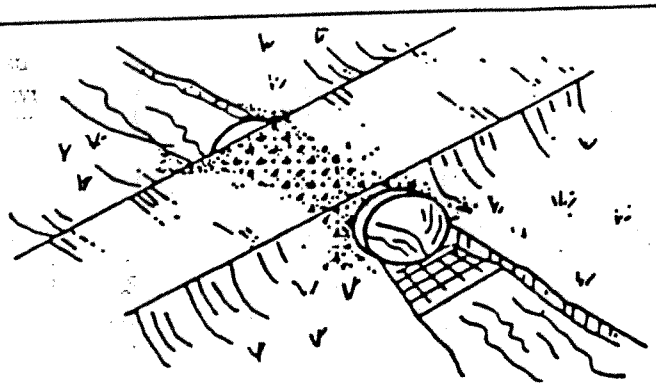
TABLE ESC 21.2 COMMONLY USED CHEMICALS FOR DUST CONTROL

	SALTS	ORGANIC, NON PETROLEUM-BASED	PETROLEUM BASED PRODUCTS[1]
CHEMICAL TYPES	• Calcium Chloride[2] • Magnesium Chloride • Natural Brines	• Calcium Lignosulfonate • Sodium Lignosulfonate • Ammonium Lignosulfonate	• Bunker Oil • Asphalt Primer • Emulsified Asphalt
LIMITATIONS	Can lose effectiveness in dry periods with low humidity. Leaches from road in heavy rain Not recommended for gravel road surfaces with low fines. Recommended 10-20% fines.	Not affected by dry weather and low humidity. Leached from road in heavy rain if not sufficiently cured. Best performance on gravel roads with high surface fines (10-30%) and dense compact surface with loose gravel.	Generally effective regardless of climatic conditions may pothole in wet weather. Best performance on gravel roads with 5-10% fines.
COMMENTS	Calcium Chloride is popular. May become slippery when wet on gravel surfaces with high fines.	Ineffective on gravel surfaces low in fines. May become slippery when wet on gravel surfaces with high fines content.	Creates a hardened crust.

[1] Motor oils and oil treatments are not recommended due to adverse effects on plant life and groundwater.

[2] Not recommended due to adverse effects on plant life.

BMP: TEMPORARY STREAM CROSSING



Objectives

- (Housekeeping Practices)
- Contain Waste
- (Minimize Disturbed Areas)
- (Stabilize Disturbed Areas)
- (Protect Slopes/Channels)
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ○ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ○ O&M Costs
- ◒ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

ESC22

Best Management Practices

GENERAL DESCRIPTION

A temporary access stream crossing is a temporary culvert, ford or bridge placed across a waterway to provide access for construction purposes for a period of less than one year. Temporary access crossings are not intended to be used to maintain traffic for the general public.

SUITABLE APPLICATIONS

Temporary stream crossings should be installed at all designated crossings of perennial and intermittent streams on the construction site, as well as for dry channels which may be significantly eroded by construction traffic.

INSTALLATION/APPLICATION CRITERIA

Requires knowledge of stream flows and soil strength and should be designed under the direction of a California registered engineer with knowledge of both hydraulics and construction loading requirements for structures.

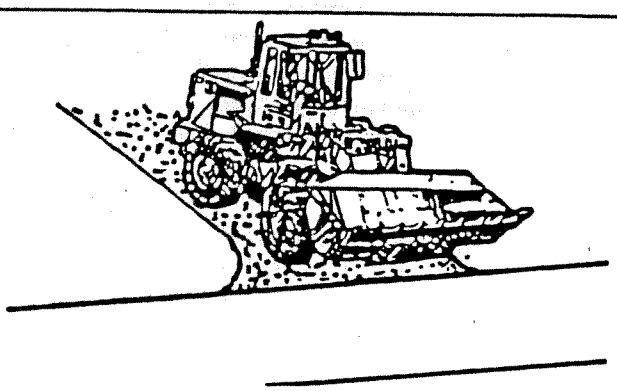
REQUIREMENTS

- Maintenance
  - Inspect weekly and after each significant rainfall, including assessment of foundations.
  - Periodically remove silt from crossings.
  - Replace lost aggregate from inlets and outlets of culverts.
- Cost
  - CalTrans Construction Cost Index for temporary bridge crossing is $45-$95 per square feet.

LIMITATIONS

- May be an expensive for a temporary improvement.
- Requires other BMPs to minimize soil disturbance during installation and removal.
- Fords should only be used in dry weather.

BMP: STABILIZED CONSTRUCTION ENTRANCE



Objectives

- (Housekeeping Practices)
- Contain Waste
- (Minimize Disturbed Areas)
- (Stabilize Disturbed Areas)
- Protect Slopes/Channels
- (Control Site Perimeter)
- Control Internal Erosion

GENERAL DESCRIPTION

The construction entrance practice is a stabilized 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. Stabalizing the construction entrance significantly reduces the amount of sediment (dust, mud) tracked off-site, especially if a washrack incorporated for removing caked on sediment.

SUITABLE APPLICATIONS

- All points of construction ingress and egress.
- Unpaved areas where sediment tracking occurs from site onto paved roads.

INSTALLATION/APPLICATION CRITERIA

- Construct on level ground where possible.
- Stones should be 1-3 inches.
- Minimum depth of stones should be 6 inches or as recommended by soils engineer.
- Length should be 50-foot minimum, and 30-foot minimum width.
- Provide ample turning radii as part of entrance.

REQUIREMENTS

- Maintenance
  - Inspect monthly and after each rainfall.
  - 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
- Cost: Average annual cost for installation and maintenance (Source: EPA, 1992)
  - Without Wash Rock: $1500 each.
  - With Wash Rock: $2200 each.

LIMITATIONS

- Requires periodic top dressing with additional stones.
- Should be used in conjunction with street sweeping on adjacent public right-of-way.

Targeted Pollutants

- (Sediment)
- (Nutrients)
- (Toxic Materials)
- (Oil & Grease)
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- (Capital Costs)
- ○ O&M Costs
- ○ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

ESC24

Best Management Practices

Additional Information — Stabilized Construction Entrance

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 trackout 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, a stabilized construction entrance should be used at all points of construction ingress and egress. NPDES permits require that appropriate measures be implemented to prevent trackout of sediments onto paved roadways, which is a significant source of sediments derived from mud and dirt carryout from the unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be build on the level ground. Advantages of the Stabilized Construction Entrance 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.

The aggregate for a stabilized construction entrance aprons should be 1 to 3 inches in size, washed, well-graded gravel or crushed rock. Minimum apron dimensions of 30 ft. x 50 ft. and 6 inches deep is adequate for two-way ingress/egress traffic.

The entrance must be properly graded to prevent runoff from leaving the construction site.
When wash areas are provided, washing is done on a reinforced concrete pad (if significant washing is necessary) or in an area stabilized with crushed stone which drains into a properly constructed sediment trap or basin (ESC 55 and 56). Sediment barriers are provided to prevent sediments from entering into the stormwater sewer system, ditch, or waterway.

Limitations

- Construct on level ground.
- 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.
- Requires periodic top dressing with additional stones.
- Should be used in conjunction with street sweeping on adjacent public right-of-way.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, June 1981.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April, 1992.

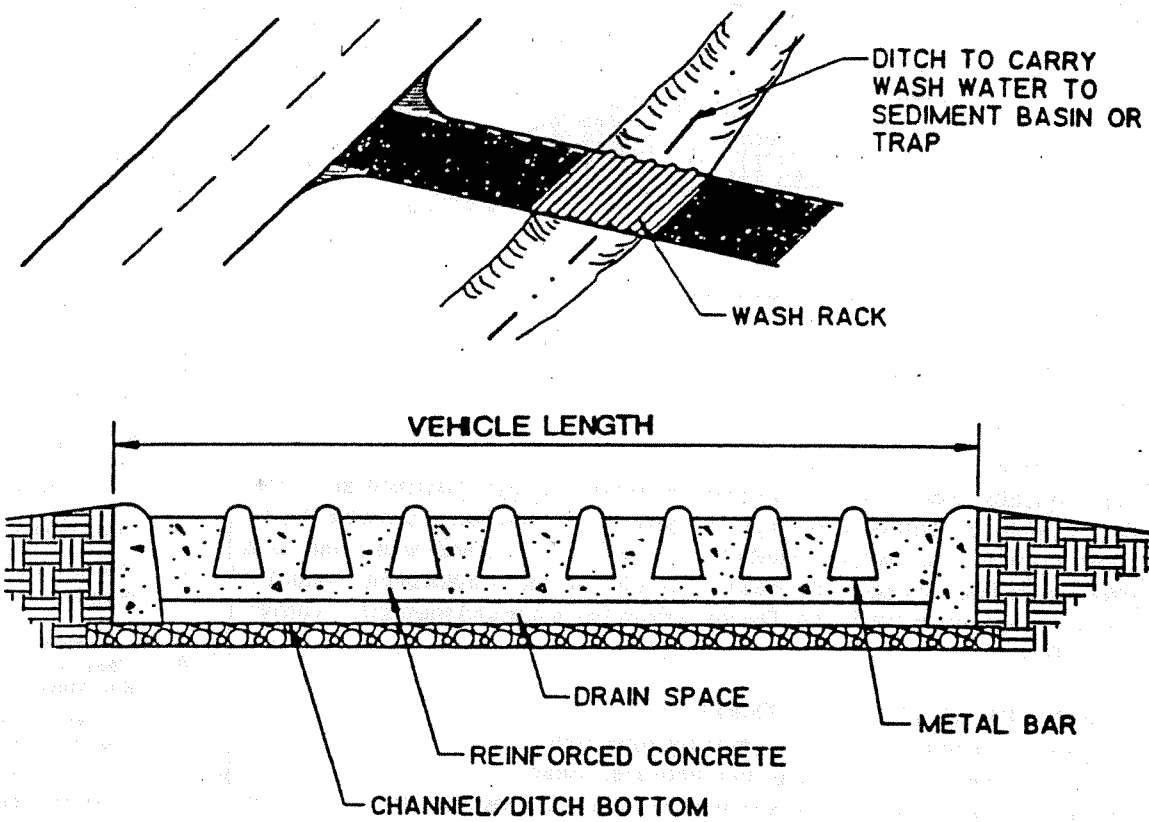
Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual - February 1992, Publication # 91-75.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

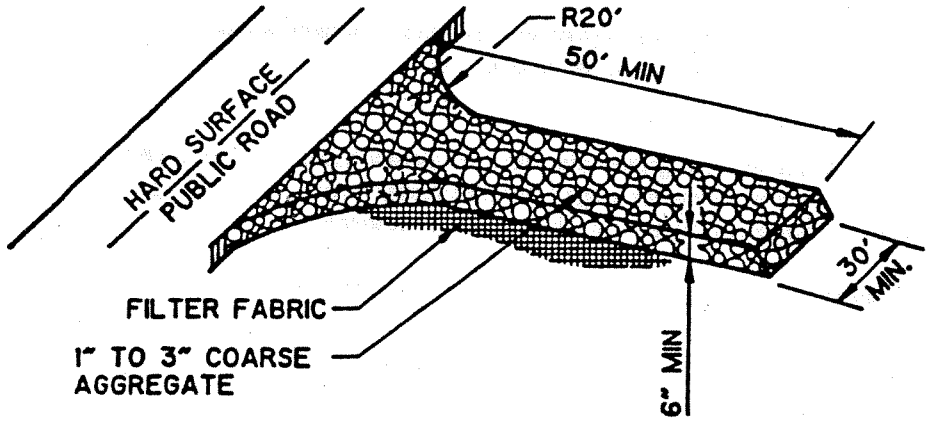
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

ESC24

Additional Information — Stabilized Construction Entrance



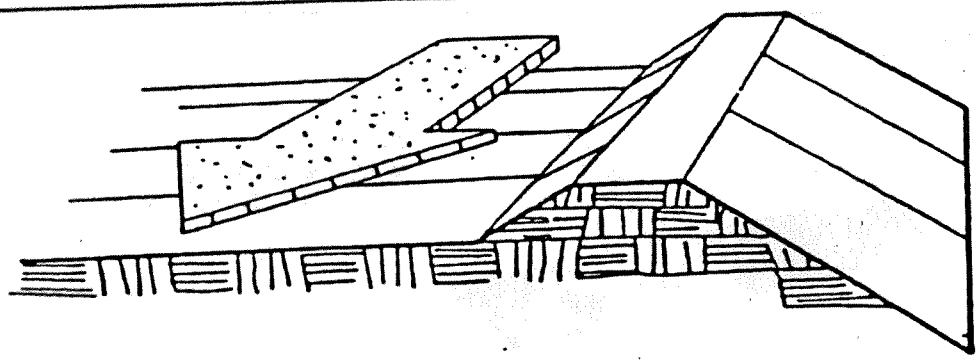
WASH RACK (SCHEMATIC)



STABILIZED CONSTRUCTION ENTRANCE

ESC24

BMP: EARTH DIKE



Objectives

- Housekeeping Practices
- (Contain Waste)
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- (Protect Slopes/Channels)
- (Control Site Perimeter)
- (Control Internal Erosion)

GENERAL DESCRIPTION

The temporary earth dike is a temporary berm or ridge of compacted soil, used to divert runoff or channel water to a desired location.

SUITABLE APPLICATIONS

Earth dikes are typically used to divert concentrated runoff through disturbed areas into another BMP (e.g., sediment basins), to divert runoff away from disturbed or unstable slopes, to divert runoff from off-site and undisturbed areas around disturbed areas, and as a containment for construction materials and wastes. The dikes should remain in place until the disturbed areas are permanently stabilized. The dikes must be on-site and must safely convey anticipated flood flows.

INSTALLATION/APPLICATION CRITERIA

- All dikes should be compacted by earth-moving equipment.
- All dikes should have positive drainage to a stabilized outlet.
- Top width may be wider and side slopes may be flatter at crossings for construction traffic.
- Dikes should direct sediment-laden runoff into a sediment trapping device.
- Dikes should be stabilized with vegetation, chemicals, or physical devices.

REQUIREMENTS

- Maintenance
  - Inspect periodically and after every significant rainfall; repair as necessary.
- Cost
  - Cost ranges from $15 to $55 per foot for both earthwork and stabilization and depends on availability of material, site location, and access.

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 storm water may cause downstream flood damage.
- Dikes should not be constructed of soils which may be easily eroded.
- Regrading the site to remove the dike may add additional cost.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ◒ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ○ O&M Costs
- ◒ Maintenance
- ○ Training
- ◒ Suitability for Slopes >5%

● High ○ Low

ESC30

Best Management Practices

Additional Information — Earth Dike

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert storm water to a sediment trapping device or 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%.

- The advantages of the temporary earth dike include the ability to handle flows from large drainage areas.
- Once stabilized, earth dikes require relatively little maintenance. Additionally, the earth dikes are relatively inexpensive to install since the soil material required for construction may be available on-site, and can be constructed as part of the initial grading operations, while the equipment is on-site.
- Uses on-site materials.

Installation/Application Criteria

Temporary earth dikes are a practical, inexpensive BMP used to divert storm water runoff. Temporary diversion dikes should be installed in the following manner:

1. All dikes should be compacted by earth-moving equipment.
2. All dikes should have positive drainage to an outlet.
3. All dikes should have 2:1 side slopes, 18 inches minimum height, and a minimum top width of 24 inches. Top width may be wider and side slopes may be flatter at crossings for construction traffic.
4. 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 (ESC 55) or sediment basin (ESC 56)when either the dike channel or the drainage area above the dike are not adequately stabilized.
5. 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.
6. 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" Rock
1.1-2.0%	6" Rock
2.1-4.0%	8" Rock
4.1-5.0%	8-12" Riprap

7. The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
8. Filter cloth may be used to cover dikes in use for long periods.
9. Construction activity on the earth dike should be kept to a minimum.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

"Draft - Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

ESC30

Additional Information — Earth Dike

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursetynsky, P.E., McGraw Hill Book Company.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, June 1981.

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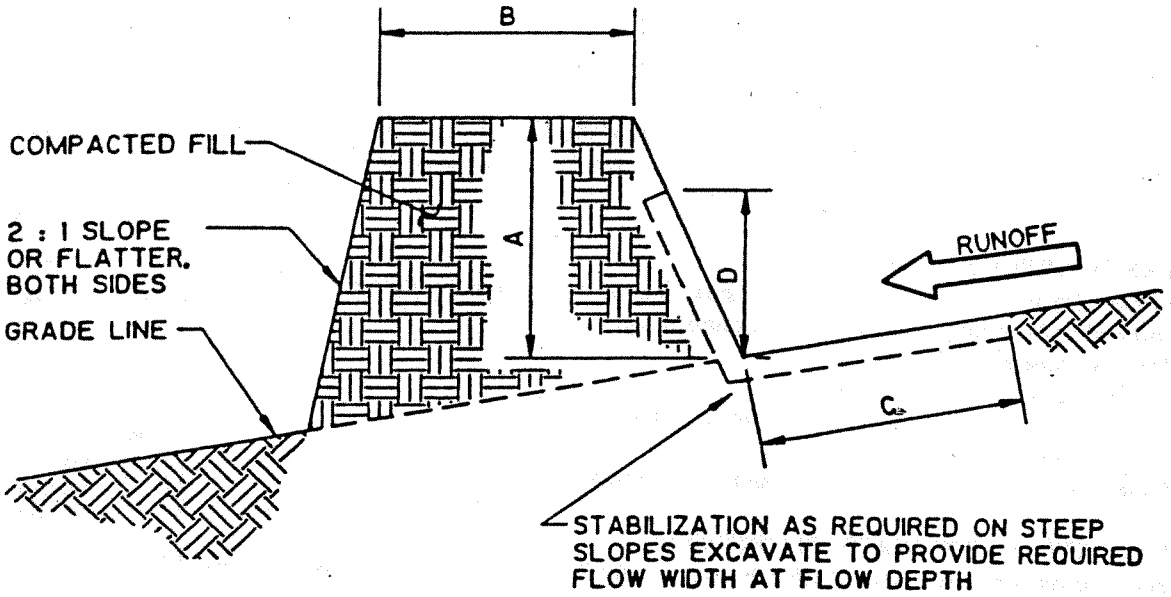
ESC30



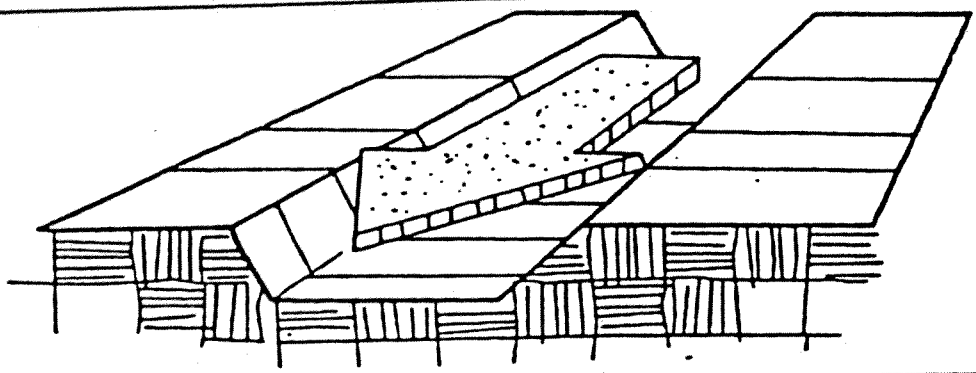
REQUIREMENTS BASED ON UPSTREAM DRAINAGE AREA

	DIKE 1 (5 ACRES OR LESS)	DIKE 2 (5-10 ACRES)
A-DIKE HEIGHT	18"	36"
B-DIKE WIDTH	24"	36"
C-FLOW WIDTH	4'	6'
D-FLOW DEPTH	8"	15"

TEMPORARY DIVERSION DIKE

ESC30

BMP: TEMPORARY DRAINS AND SWALES



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

Targeted Pollutants

- ● *Sediment*
- ○ *Nutrients*
- ○ *Toxic Materials*
- ○ *Oil & Grease*
- ○ *Floatable Materials*
- ○ *Other Construction Waste*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ○ *O&M Costs*
- ○ *Maintenance*
- ○ *Training*
- ◒ *Suitability for Slopes >5%*

● *High* ○ *Low*

ESC31

Best Management Practices

GENERAL DESCRIPTION

Temporary drains and swales are used to divert off-site runoff around the construction site, divert runoff from stabilized areas around disturbed areas, and direct runoff into sediment basins or traps.

SUITABLE APPLICATIONS

Temporary drains and swales are appropriate for diverting any upslope runoff around unstabilized or disturbed areas of the construction site:

- Prevent slope failures.
- Prevent damage to adjacent property.
- Prevents erosion and transport of sediments into water ways.
- Increases the potential for infiltration.
- Diverts sediment-laden runoff into sediment basins or traps.

INSTALLATION/APPLICATION CRITERIA

Temporary drainage swales will effectively convey runoff and avoid erosion if built properly:

- Size temporary drainage swales using local drainage design criteria.
- A permanent drainage channel must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drain/swale should conform to predevelopment drainage patterns and capacities.
- Construct the drain/swale with an uninterrupted, positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drain or swale can reach an erosive velocity.

REQUIREMENTS

- Maintenance
  - Inspect weekly and after each rain.
  - Repair any erosion immediately.
  - Remove sediment which builds up in the swale and restricts its flow capacity.
- Cost
  - The cost of a drainage swale increases with drainage area and slope. Typical. swales for controlling internal erosion are inexpensive.

LIMITATIONS

- 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.

Additional Information — Temporary Drains and Swales

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 (see ESC30) at the top of a slope can safely divert runoff to a location where it can safely be brought to the bottom of the slope (see Pipe Slope Drain ESC32). 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/or the slopes are stabilized.

Diversion practices concentrate the volume of 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. A swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization, if significant erosion will occur. Any drain or swale which conveys sediment-laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

Installation/Application Criteria

Diversion drains or 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, drains or swales should be designed as follows:

- No more than 5 acres may drain to a temporary drain or swale
- Place the drain or swale above, not on, a cut and fill slope
- Swale bottom width should be at least 2 ft
- Depth of the swale should be at least 18 inches
- Side slopes should be 2:1 or flatter
- Drain or swale should be layed at a grade of at least 1 percent, but not more than 15 percent
- The swale must not be overtopped by the 10-year, 24-hour 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
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- The cost of swales and other diversion devices is generally included in the earthwork cost, as a separate item under the grading budget of the project construction contract.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

"Draft - Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, June 1981.

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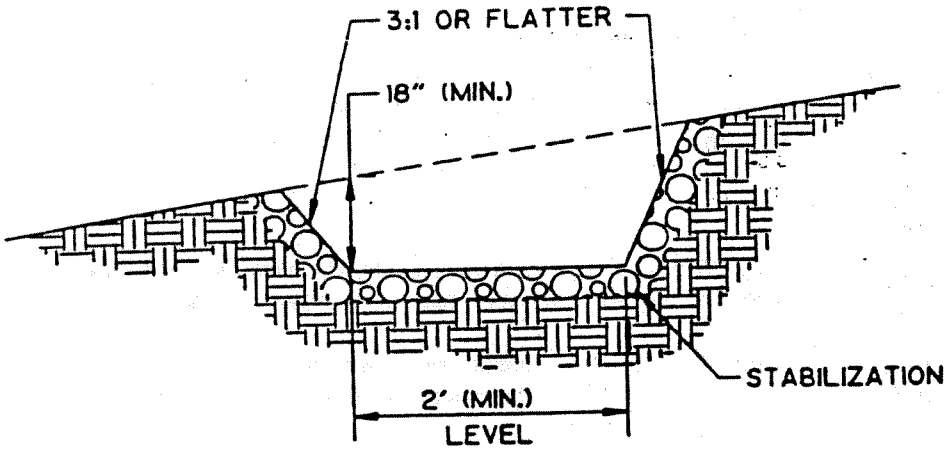
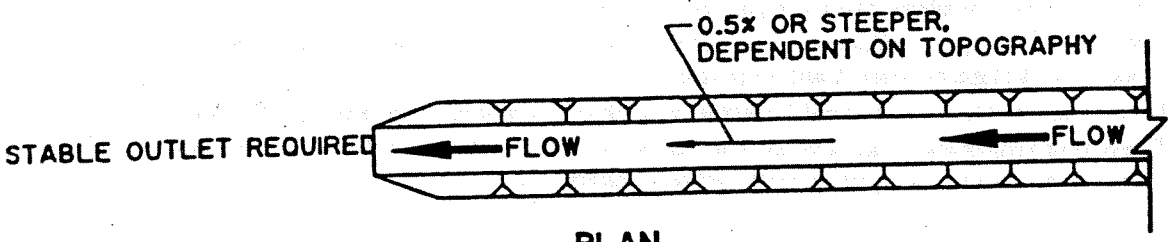
ESC31



CROSS SECTION

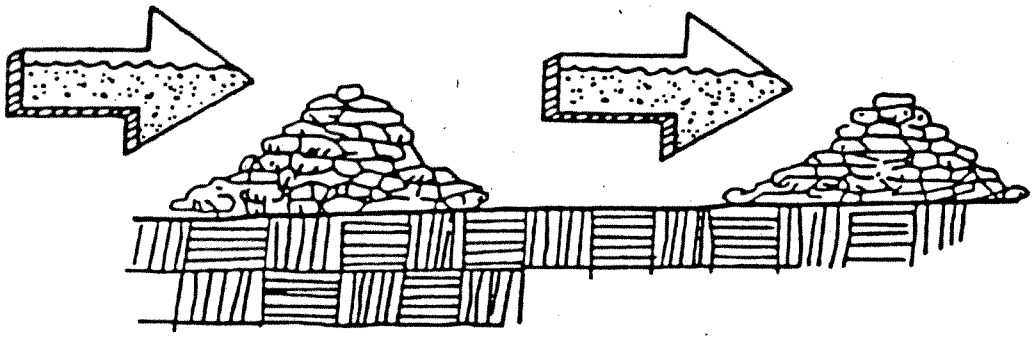


PLAN

TEMPORARY DRAINAGE SWALE

ESC31

BMP: CHECK DAMS



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- (Protect Slopes/Channels)
- Control Site Perimeter
- Control Internal Erosion

GENERAL DESCRIPTION

Small temporary dams constructed across a swale or drainage ditch. Check dams reduce the velocity of concentrated stormwater flows, thereby reducing erosion of the swale or ditch, and promoting sedimentation behind the dam. If properly anchored, brush or rock filter berms (ESC53) may be used for check dams.

SUITABLE APPLICATIONS

- Used to prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- May also promote sedimentation behind the dam, but should not be considered to be a primary sediment trapping device because subsequent storms will scour and resuspend much of the trapped sediment.

INSTALLATION/APPLICATION CRITERIA

- Check dams should be placed at a distance and height to allow small pools to form between each one.
- Backwater from a downstream check dam should reach the toe of the upstream check dam.
- Major floods (2 year storm or larger) should safely flow over the check dam without an increase in upstream flooding or destruction of the checkdam.
- Primarily used in small, steep channels where velocities exceed 2 fps.
- Used in steep terrain where velocity reduction is required.
- A deep sump may be provided immediately upstream of the check dam to capture excessive sediment.
- Check dams may be built of rocks or logs, which are secured against damage during significant floods.

REQUIREMENTS

- Maintenance
  - Inspect for sediment buildup behind the check dam and signs of erosion around the check dam after each rain.
  - Remove accumulated sediment whenever it reaches one-half the sump depth.
- Cost
  - See CalTrans Cost Schedule for regional cost data.

LIMITATIONS

- Use only in small open channels which drain 10 acres of less.
- Not to be used in live streams.
- Do not install in lined or vegetated channels.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ○ O&M Costs
- ◒ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

ESC41

Best Management Practices

Additional Information — Check Dams

Check dams create small pools in swales and ditches which drain 10 acres or less. These pools reduce the velocity of storm water flows, thus reducing erosion of the swale/ditch. Sedimentation also occurs in these small pools, but probably results in little net sediment removal because of the small detention time and probable scour during longer storms. A sediment trap (ESC55) may be placed immediately upstream of the check dam to increase sediment removal efficiency (but never in a natural stream or channel). Check dams should not be placed in swales/ditches with a base flow during some or all of the year.

Installation/Application Criteria

Check dams must be sized and constructed correctly and maintained properly, or they will be either washed out or cause flooding. Check dams can be constructed of either rock or logs. Use of other natural materials available on-site that can withstand the stormwater flow velocities is acceptable, such as pea-gravel filled in sand bags. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

A sediment trap (ESC55) may be installed immediately upstream of the check dam, but may be of limited effectiveness if channel flows are large enough to scour the trap during moderate to large storms. Maximum velocity reduction is achieved if the toe of the upstream dam is at the same elevation as the top of the downstream dam. The center section of the dam should be lower than the edge sections so that the check dam will act like a weir during major floods.

Rock check dams are usually constructed of appropriately 8"-12" rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam must completely span the ditch or swale to prevent washout. The rock used must be large enough to stay in place given the expected design flow through the channel.

Log check dams are usually constructed of 4 to 6-inch diameter logs. The logs should be embedded into the soil at least 18 inches.

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 swale is greater than 4 percent).

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Mariposa County, Arizona, September 1992.

"Draft - Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, June 1981.

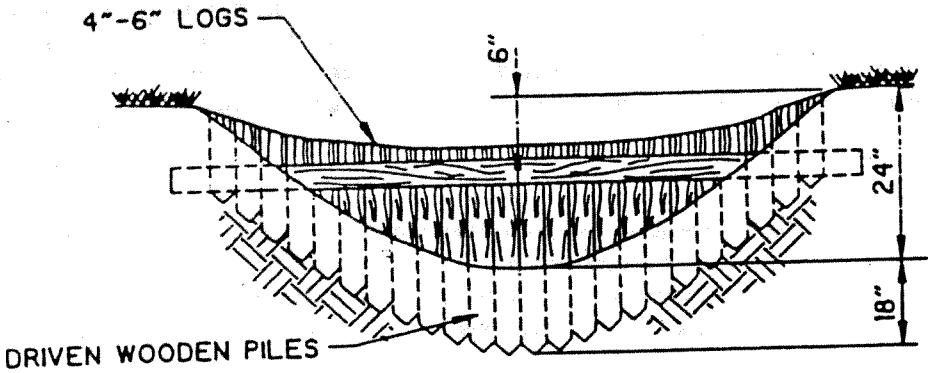
Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual - February 1992, Publication # 91-75.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

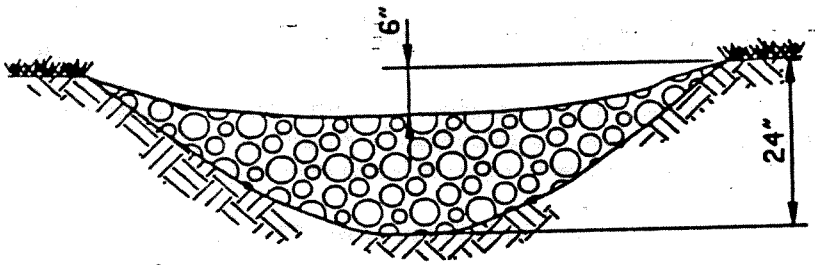
ESC41

Best Management Practices

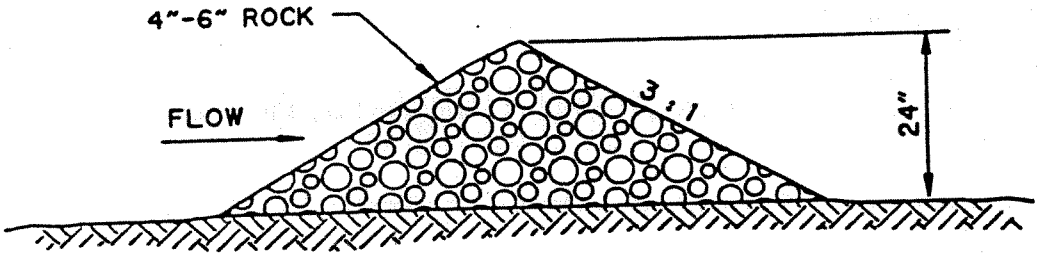
Additional Information — Check Dams



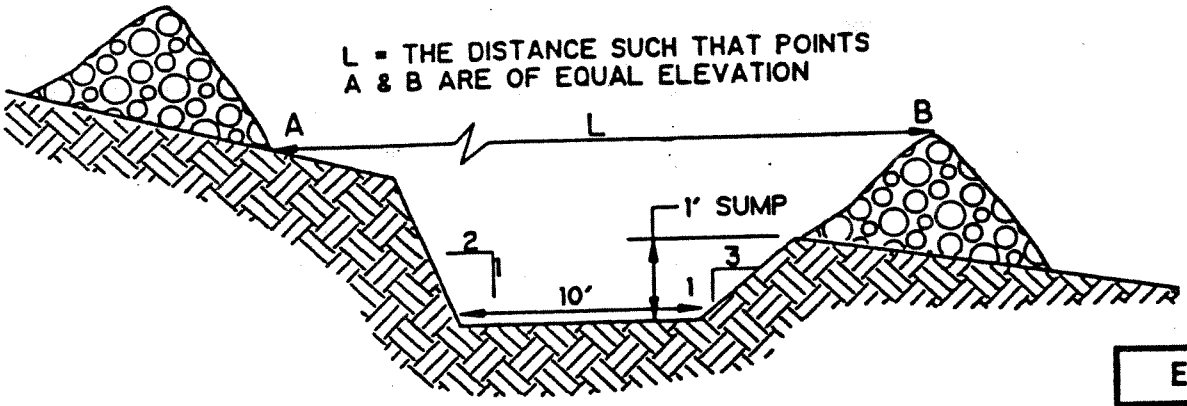
LOG CHECK DAM



ROCK CHECK DAM



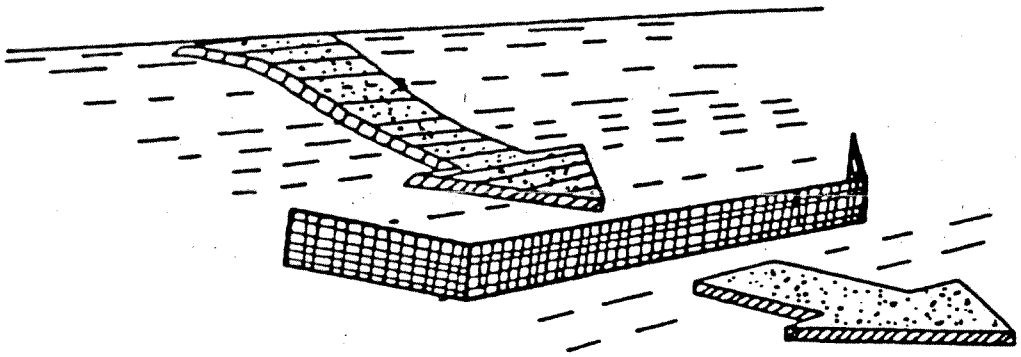
ROCK CHECK DAM CROSS-SECTION



SPACING BETWEEN CHECK DAMS

ESC41

BMP: SILT FENCE



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

GENERAL DESCRIPTION

A silt fence is made of a filter fabric which has been entrenched, attached to supporting poles, and sometimes backed by a wire fence for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

SUITABLE APPLICATIONS

- Along the perimeter of the site.
- Below the toe of a cleared slope.
- Along streams and channels.
- Around temporary spoil areas.
- Across swales with catchments less than 1 acre.
- Below other small cleared areas.

INSTALLATION/APPLICATION

- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 feet at any point.
- No more than 1 acre, 100 ft., or 0.5 cfs of concentrated flow should drain to any point along the silt fence.
- Turn ends of fence uphill.
- Provide area behind the fence for runoff to pond and sediment to settle (approx. 1200 sq. ft. per acre draining to the silt fence).
- Select filter fabric which retains 85% of the soil, by weight, based on sieve analysis, but is not finer than an equivalent opening size of 70.

REQUIREMENTS

- Maintenance
  - Inspect weekly and after each rainfall.
  - Repair wherever fence is damaged.
  - Remove sediment when it reaches 1/3 the height of the fence.
- Cost (source: EPA, 1992)
  - Average annual cost for installation and maintenance (assumes 6 month useful life): $7 per lineal foot ($850 per drainage acre)

LIMITATIONS

- Do not use where 85% of the soil, by weight, passes through a No. 200 sieve because the filter fabric will clog.
- Do not place fence on a slope, or across any contour line.
- Do not use in streams, channels, or anywhere flow has concentrated.
- Do not use in locations where ponded water may cause flooding.

Targeted Pollutants

- ● *Sediment*
- ○ *Nutrients*
- ○ *Toxic Materials*
- ○ *Oil & Grease*
- ○ *Floatable Materials*
- ○ *Other Construction Waste*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ◒ *O&M Costs*
- ◒ *Maintenance*
- ○ *Training*
- ○ *Suitability for Slopes >5%*

● *High* ○ *Low*

ESC50

Best Management Practices

Additional Information — Silt Fence

A silt fence is a temporary sediment barrier consisting of filter fabric stretched across and attached to supporting posts, entrenched, and, depending upon the strength of the fabric used, supported with wire fence. Silt fences trap sediment in two ways: (1) by intercepting and detaining small amounts of sediment from disturbed areas during construction operations in order to promote sedimentation behind the fence; and (2) by decreasing the velocity of low flows (up to 0.5 cfs) in swales.

Silt fences may be used for perimeter control, placed upstream of the point(s) of discharge of sheet flow from a site. They may also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion, and perpendicular to minor swales or ditch lines for up to one acre contributing drainage areas. Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows.

Installation/Application

Planning:

Silt fences are generally most effective when the following placement criteria are followed:

- Limit the upstream drainage area to 1 acre or less when used alone or in combination with sediment basin in a larger site.
- The maximum slope perpendicular to the fence line should be 1:1.
- Limit the maximum sheet or overland flow path length to any point along the fence to 100 feet.
- Limit the concentrated flows reaching the fence to 0.5 cfs.

Silt fences are preferable to straw barriers in many cases. Laboratory work at the Virginia Highway and Transportation Research Council has shown that silt fences can trap a much higher percentage of suspended sediments than can straw bales. While the failure rate of silt fences is lower than that of straw barriers, there are many instances where silt fences have been improperly installed. The following installation methods can improve performance and should be followed:

- Construct the silt fence along a level contour.
- Silt fences should remain in place until the disturbed area is permanently stabilized.
- 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 sq. ft. of ponding area should be provided for every acre draining to the fence.
- Turn the ends of the filter fence uphill to prevent storm water from flowing around the fence.
- Leave an undisturbed or stabilized area immediately downslope from the fence.
- Do not place in live streams or intermittently flowing channels.

Design:

Selection of a filter fabric is based on soil conditions at the construction site (which affect the equivalent opening size (EOS) fabric specification) and characteristics of the support fence (which affect the choice of tensile strength). The designer should specify a filter fabric that retains the soil found on the construction site yet will have openings large enough to permit drainage and prevent clogging. The following criteria is recommended for selection of the equivalent opening size:

1. If 50 percent or less of the soil, by weight, will pass the U.S. standard sieve No. 200, select the EOS to retain 85 percent of the soil. The EOS should not be finer than EOS 70.
2. For all other soil types, the EOS should be no larger than the openings in the U.S. Standard Sieve No. 70 [0.0083 in. (0.21 mm.)] except where direct discharge to a stream, lake, or wetland will occur, then the EOS should be no larger than Standard Sieve No. 100.

ESC50

Additional Information — Silt Fence

To reduce the chance of clogging, it is preferable to specify a fabric with openings as large as allowed by the criteria. No fabric should be specified with an EOS smaller than U.S. Standard Sieve No. 100 [0.0059 in. (0.15 mm.)]. If 85 percent or more of a soil, by weight, passes through the openings in a No. 200 sieve [0.0029 in. (0.074 mm.)], filter fabric should not be used. Most of the particles in such a soil would not be retained if the EOS was too large, and they would clog the fabric quickly if the EOS was small enough to capture the soil.

The fence should be supported by a 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). Filter fabric material should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0° F. to 120° F.

Installation Guidelines:
Filter 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.

- Posts should be spaced a maximum of 6 feet apart and driven securely into the ground a minimum of 30 inches.
- A trench should be excavated approximately 8 inches wide and 12 inches deep along the line of posts and upslope from the barrier.
- When standard strength filter fabric is used, a wire mesh support fence should be fastened securely to the upslope side of the posts using heavy-duty wire staples at least 1 inch long, tie wires or hog rings. The wire should extend into the trench a minimum of 4 inches.
- The standard strength filter fabric should be stapled or wired to the fence, and 40 inches of the fabric should extend into the trench. When extra-strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated and the filter fabric stapled or wired directly to the posts.
- Avoid the use of joints. The filter fabric should be purchased in a continuous roll, then cut to the length of the barrier. When joints are necessary, filter cloth should be spliced together only at a support post, with a minimum 6 inch overlap, and both ends securely fastened to the post.
- The trench should be backfilled with compacted native material.

Requirements
Maintenance:

Inspect monthly during dry periods and immediately after each rainfall. Repair as necessary. Sediment must be removed when it reaches approximately one third the height of the fence, especially if heavy rains are expected.

Filter fences should not be removed until the upslope area has been permanently stabilized.

Limitations
- Filter fences will create a temporary sedimentation pond on the upstream side of the fence and may cause temporary flooding. Fences not constructed on a level contour will be overtopped by concentrated flow resulting in failure of the filter fence.
- Filter fences are not practical where large flows of water are involved, hence the need to restrict their use to drainage areas of one acre or less, and flow rates of less than 0.5 cfs.
- Problems may arise from incorrect selection of pore size and/or improper installation.
- Do not allow water depth to exceed 1.5 ft. at any point.
- Improperly installed fences are subject to failure from undercutting, overlapping, or collapsing.

ESC50

Best Management Practices

Additional Information — Silt Fence

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September1992.

Environmental Action Manual, City of Austin, Texas, 1989.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, Jun 1981.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April, 1992.

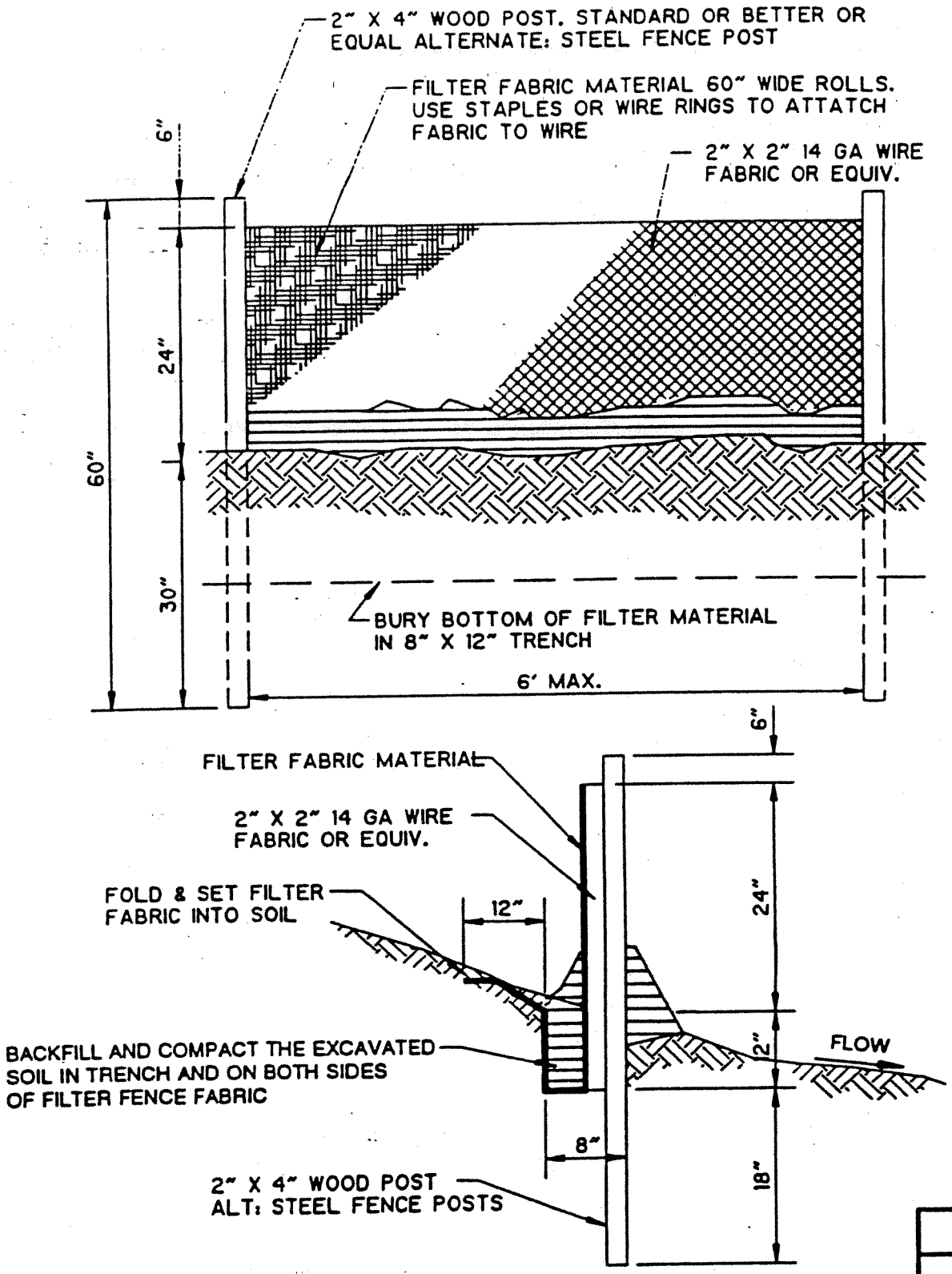
Sedimentation and Erosion Control Practices, An Introductory of Current Practices (Draft), USEPA, 1990.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

ESC50

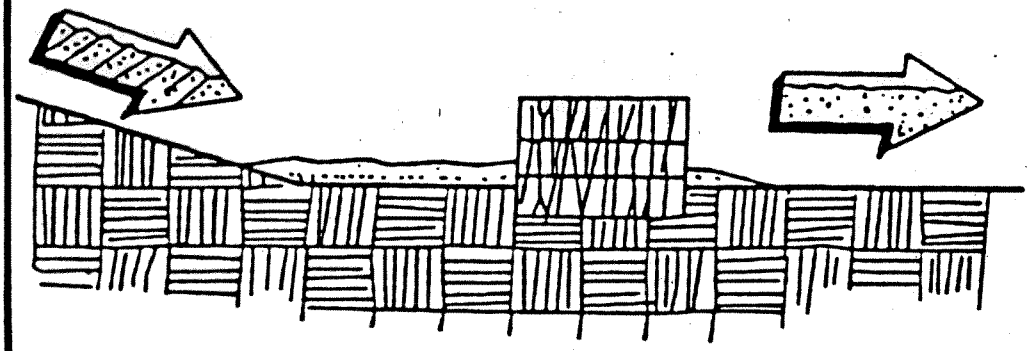
Additional Information — Silt Fence



SILT FENCE

ESC50

BMP: STRAW BALE BARRIERS



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter* (●)
- *Control Internal Erosion* (●)

GENERAL DEFINITION

A straw bale barrier consists of straw bales placed end to end along a level contour in a shallow trench and staked to hold them in place. The barrier detains runoff, creating a pond behind the barrier where sedimentation occurs.

SUITABLE APPLICATIONS

- Along the perimeter of the site.
- Along streams and channels.
- Across swales with small catchments.
- Around temporary spoil areas.
- Below other small, cleared areas.

INSTALLATION/APPLICATION CRITERIA

- Use primarily in areas where sheet or rill flow occurs.
- No more than 1/4 acre per 100 feet of barrier should drain to the barrier.
- Install along a level contour.
- Place in a 4-inch deep trench.
- Backfill and compact the excavated soil on the upstream face of the barrier.
- Secure each bale with two stakes.
- Leave enough area (about 1200 sq. ft. per acre) behind the barrier for runoff to pond (no more than 1.5 ft. depth) and sediment to settle.

REQUIREMENTS

- Maintenance
  - Inspect weekly and after each rain.
  - Replace bales which have decomposed or whose bindings have broken.
  - Remove sediment behind the barrier when it reaches a depth of 6 inches.
- Costs (source: EPA, 1992)
  - Average annual cost for installation and maintenance (assumes 3 month useful life): $17 per lineal foot ($6,800 per drainage acre).

LIMITATIONS

- Straw bale barriers are not to be used for extended periods of time because they tend to rot and fall apart.
- Suitable only for sheet flow on slopes of 2% or flatter.
- Not appropriate for large drainage areas, limit to one acre or less.
- Straw bales lose their effectiveness rapidly due to rotting, thus constant maintenance is required.
- Not recommended for concentrated flow, inlet protection, channel flow, and live streams.
- Bale bindings of jute or cotton not recommended.

Targeted Pollutants

- ● *Sediment*
- ○ *Nutrients*
- ○ *Toxic Materials*
- ○ *Oil & Grease*
- ○ *Floatable Materials*
- ○ *Other Construction Waste*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ● *Capital Costs*
- ● *O&M Costs*
- ● *Maintenance*
- ○ *Training*
- ○ *Suitability for Slopes >5%*

● *High* ○ *Low*

ESC51

Best Management Practices

- Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainageways 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.

ESC51

Additional Information — Straw Bale Barrier

A straw bale barrier consists of a series of secured anchored bales placed to intercept sediment-laden runoff from small drainage areas of disturbed soil. The barrier ponds runoff and allow sediment to settle. Straw bale dikes should not be used for extended periods of time because they tend to rot and fall apart.

The straw bale barrier is used where there are no concentrations of water in a channel or drainageway, and where erosion would occur from sheet flow. These barriers are typically constructed below disturbed areas subject to sheet flow of runoff.

Installation/Application

Straw bale barriers should be used for drainage areas no more than 1/4 acre per 100 feet of barrier length, with no more than 100 ft upstream of any point along the barrier. The barrier should be placed along a level contour no greater than 2:1. When installed and maintained according to the guidelines on this fact sheet, straw bale dikes remove approximately 67% of the sediment transported in construction site runoff. This optimum efficiency can only be achieved through careful maintenance, with special attention to replacing rotted or broken bales. The barrier should be constructed on a level contour to prevent concentration of flow against a small portion of the barrier.

An effective straw bale barrier should be installed in the following manner:

1. Bales should be placed on the contour and in a row with ends tightly abutting the adjacent bales.
2. Leave area for runoff to pond upstream of the barrier by locating barrier away from the toe of slopes. This also provides access for maintenance.
3. Each bale should be embedded in the soil a minimum of (4) inches and placed so the bindings are horizontal. Bindings placed on soil will soon disintegrate and cause the barrier to fail.
4. Bales should be securely anchored in place by either two stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale at an angle to force the bales together. Stakes should be driven flush with the bale.
5. Backfill and compact the excavated soil along the upstream face of the barrier.
6. Remove the barrier when it has served its usefulness so as not to block or impede storm flow or drainage.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

"Draft - Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

"Environmental Criteria Manual", City of Austin, Texas.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, Jun 1981.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April, 1992.

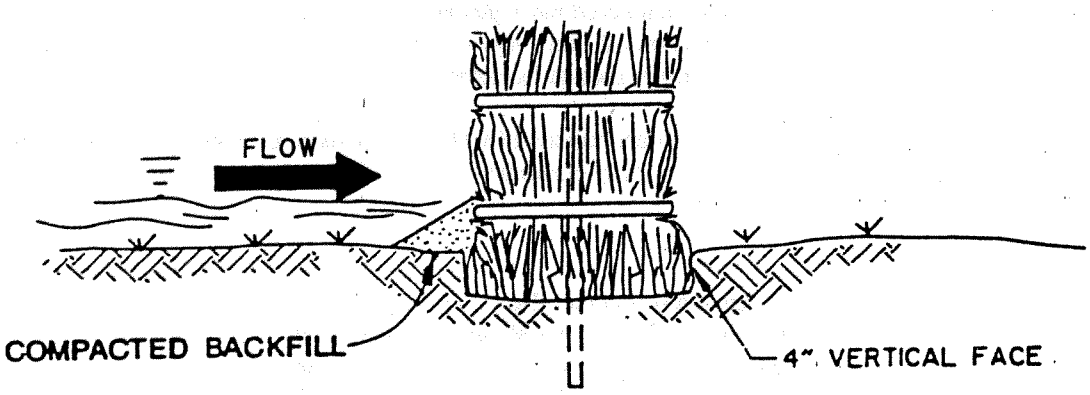
Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual - February 1992, Publication # 91-75.

Water Quality for Construction Businesses, City of Bellevue, Washington.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

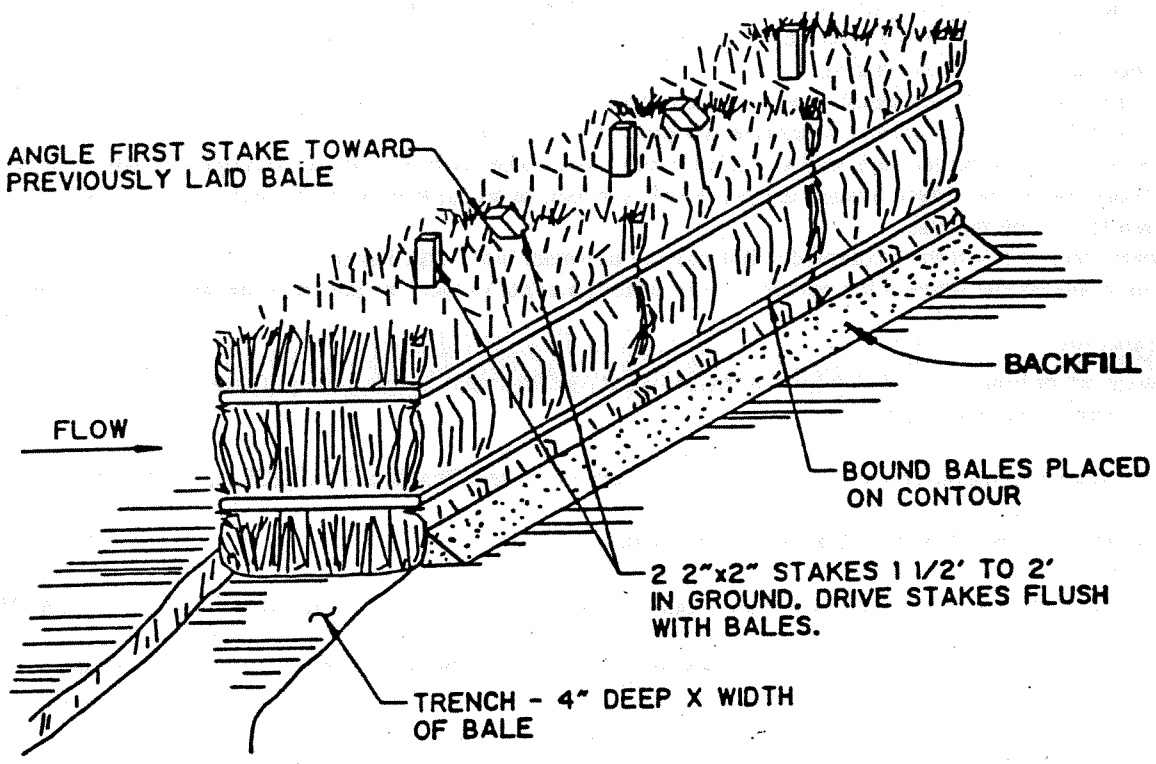
ESC51

Additional Information — Straw Bale Barrier



- PROMOTES ON SITE SEDIMENTATION BY CREATING A TEMPORARY POND.

BEDDING DETAIL



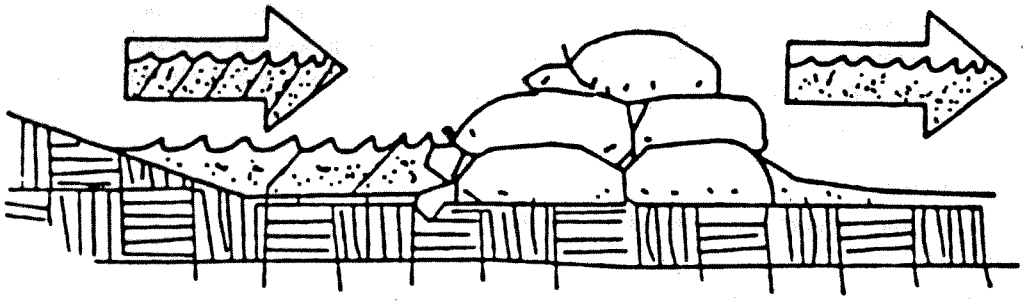
SUBSTITUTION OF STEEL BARS FOR WOODEN STAKES IS NOT RECOMMENDED DUE TO POTENTIAL FOR DAMAGING CONSTRUCTION EQUIPMENT

ANCHORING DETAIL

STRAW BALE BARRIERS

ESC51

BMP: SAND BAG BARRIER



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- (Protect Slopes/Channels)
- (Control Site Perimeter)
- (Control Internal Erosion)

GENERAL DEFINITION

Stacking sand bags along a level contour creates a barrier which detains sediment-laden water, ponding water upstream of the barrier and promoting sedimentation.

SUITABLE APPLICATIONS

- Along the perimeter of the site.
- Check dams across streams and channels.
- Along streams and channels.
- Barrier for utility trenches in a channel.
- Across swales with small catchments.
- Division dike or berm.
- Below the toe of a cleared slope.
- Create a temporary sediment trap.
- Around temporary spoil areas.
- Below other small cleared areas.

INSTALLATION/APPLICATION CRITERIA

- May be used in drainage areas up to 5 acres.
- Install along a level contour.
- Base of sand bag barrier should be at least 48 inches wide.
- Height of sand bag barrier should be at least 18 inches high.
- 4 inch PVC pipe may be installed between the top layer of sand bags to drain large flood flows.
- Provide area behind barrier for runoff to pond and sediment to settle, size according to sediment trap BMP criteria (ESC55).
- Place <u>below</u> the toe of a slope.
- Use sand bags large enough and sturdy enough to withstand major flooding.

REQUIREMENTS

- Maintenance
  - Inspect after each rain.
  - Reshape or replace damaged sand bags immediately.
  - Remove sediment when it reaches six inches in depth.
- Cost
  - Sand bag barriers are more costly, but typically have a longer useful life than other barriers.

LIMITATIONS

- Sand bags are more expensive than other barriers, but also more durable.
- Burlap should not be used for sand bags.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ● Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ○ Training
- ◒ Suitability for Slopes >5%

● High ○ Low

ESC52

Best Management Practices

Additional Information — Sand Bag Barrier

Suitable Applications

Sand bag berms may be used during construction activities in stream beds and utility construction in channels, temporary channel crossing for construction equipment, etc. Sand bag berms may also be installed parallel to roadway construction. Sand bag berms may also be used to create temporary sediment traps, retention basins and in place of straw bales or silt fences. Examples of applications include:

- Check dams across stream channels.
- Barriers for utility trenches or other construction in a stream channel.
- At temporary channel crossings.
- May be used on a slope where straw bales and silt fences are not appropriate.
- As a diversion dike.
- Embankment for a temporary sediment basin or retention basin.
- Sediment barriers near the toe of slopes.
- At construction perimeter.

Advantages

- Provides a semi-permeable barrier in potentially wet areas.
- More permanent than silt fences or straw bales.
- Allows for easy relocation on site to meet changing needs during construction.

Installation/Application

Sand bag barriers may be used for sediment trapping in locations where silt fences and straw bale barriers are not strong enough. In addition, sand bag barriers are appropriate to use when construction of check dams or sumps in a stream is undesirable. The sand bag berms can provide the same function as a check dam without disturbing the stream or vegetation. The sand bag berm will also allow a small sediment retention area to be created prior to construction of final detention basins. For installation of a sand bag berm, the following criteria should be observed:

- Drainage Area - Up to five (5) acres.
- Height of Berm - 18 inches minimum height, measured from the top of the existing ground at the upslope toe to the top of the barrier.
- Width of Berm - 48 inches minimum width measured at the bottom of the barrier; 18 inches at the top.
- Sand bag Size - Length 24 to 30 inches, width 16 to 18 inches and thickness six (6) to eight (8) inches. Weight 90 to 125 pounds.
- Sand bag Material - Polypropylene, polyethylene or polyamide woven fabric, minimum unit weight four (4) ounces per square yard, mullen burst strength exceeding 300 psi and ultraviolet stability exceeding 70 percent. Use of burlap is discouraged since it rots and deteriorates easily.
- Grade of Sand - Coarse sand, gravel.
- Runoff water should be allowed to flow over the tops of the sand bags or through four (4) inch polyvinyl chloride pipes embedded below the top layer of bags.
- Area behind the sand bag barrier should be established according to sizing criteria for sediment trap BMP (ESC55).

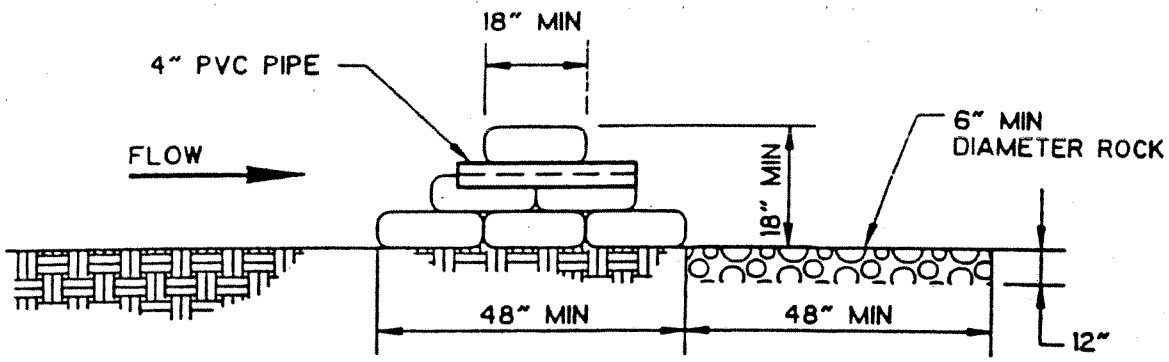
REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

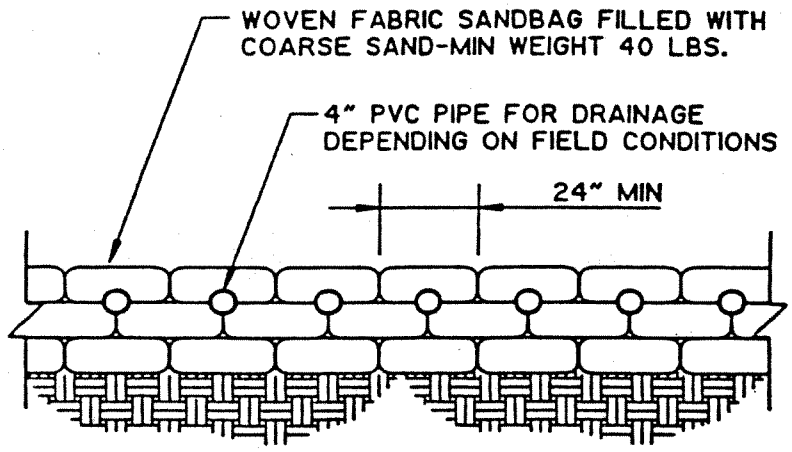
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

ESC52

Additional Information — Sand Bag Barrier



CROSS-SECTION



FRONT VIEW

SAND BAG BERM

ESC52

Attachment 2

EPA NPDES General Permit for Storm Water Discharges from Large and Small Construction Activities, effective July 1, 2003 (as modified effective January 21, 2005)

NPDES General Permit for Storm Water Discharges From Construction Activities

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National Pollutant Discharge Elimination System
General Permit for Discharges from
Large and Small Construction Activities

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 et. seq., (hereafter CWA or the Act), as amended by the Water Quality Act of 1987, P.L. 100-4, operators of large and small construction activities that are described in Subpart 1.3 of this National Pollutant Discharge Elimination System (NPDES) general permit, except for those activities excluded from authorization of discharge in Subpart 1.3.C of this permit are authorized to discharge pollutants to waters of the United States in accordance with the conditions and requirements set forth herein. Permit coverage is required from the "commencement of construction activities" until "final stabilization" as defined in Appendix A.

This permit shall become effective on July 1, 2003 (as modified effective January 21, 2005).

This permit and the authorization to discharge shall expire at midnight, July 1, 2008.

Signed:

Linda M. Murphy, Director, Office of Ecosystem Protection
EPA Region 1

Kevin Bricke, Acting Director, Division of Environmental Planning and Protection
EPA Region 2

Carlos E. O'Neill, P.E., Acting Division Director, Caribbean Environmental Protection Division
EPA Region 2

John M. Capacasa, Director, Water Protection Division
EPA Region 3

Rebecca Harvey, Chief, NPDES Program Branch
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EPA Region 7

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The signatures are for the permit conditions in Parts 1 through 9 and Appendices A through G and for any additional conditions which apply to facilities located in the corresponding state, Indian country, or other area.

PART 1: COVERAGE UNDER THIS PERMIT

1.1 Introduction

This Construction General Permit (CGP) authorizes storm water discharges from large and small construction activities that result in a total land disturbance of equal to or greater than one acre, where those discharges enter surface waters of the United States or a municipal separate storm sewer system (MS4) leading to surface waters of the United States subject to the conditions set forth in this permit. This permit also authorizes storm water discharges from any other construction activity designated by EPA where EPA makes that designation based on the potential for contribution to an excursion of a water quality standard or for significant contribution of pollutants to waters of the United States. This permit replaces two permits issued in 1998 (63 FR 7858, February 17, 1998 for EPA Regions 1, 2, 3, 7, 8, 9, and 10 and 63 FR 36489, July 6, 1998 for EPA Region 6). Any references to the 1998 CGP in this permit refer to those two permits.

This permit is presented in a reader-friendly, plain language format. This permit uses the terms "you" and "your" to identify the person(s) who owns or operates a "facility" or "activity" as defined in Appendix A and who must comply with the conditions of this permit. This format should allow you, the permittee and operator of a large or small construction activity, to easily locate and understand applicable requirements.

The goal of this permit is to reduce or eliminate storm water pollution from construction activity by requiring that you plan and implement appropriate pollution control practices to protect water quality.

1.2 Permit Area

If your large or small construction activity is located within the areas listed in Appendix B, you may be eligible to obtain coverage under this permit. Permit coverage is actually provided by legally separate and distinctly numbered permits covering each of the areas listed in Appendix B.

1.3 Eligibility

Permit eligibility is limited to discharges from "large" and "small" construction activity as defined in Appendix A or as otherwise designated by EPA. This general permit contains eligibility restrictions, as well as permit conditions and requirements. You may have to take certain actions to be eligible for coverage under this permit. In such cases, you must continue to satisfy those eligibility provisions to maintain permit authorization. If you do not meet the requirements that are a pre-condition to eligibility, then resulting discharges constitute unpermitted discharges. By contrast, if you do not comply with the requirements of the general permit, you may be in violation of the general permit for your otherwise eligible discharges.

A. Allowable Storm Water Discharges

Subject to compliance with the terms and conditions of this permit, you are authorized to discharge pollutants in:

1. Storm water associated with large and small construction activity as defined in Appendix A;
2. Storm water discharges designated by EPA as needing a storm water permit under 40 CFR §122.26(a)(1)(v) or §122.26(b)(15)(ii);
3. Discharges from support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided:
    a. The support activity is directly related to the construction site required to have NPDES permit coverage for discharges of storm water associated with construction activity;
    b. The support activity is not a commercial operation serving multiple unrelated construction projects by different operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and
    c. Appropriate controls and measures are identified in a Storm Water Pollution Prevention Plan (SWPPP) covering the discharges from the support activity areas; and
4. Discharges composed of allowable discharges listed in 1.3.A and 1.3.B commingled with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

B. Allowable Non-Storm Water Discharges

You are authorized for the following non-storm water discharges, provided the non-storm water component of the discharge is in compliance with Subpart 3.5 (Non-Storm Water Discharge Management):

1. Discharges from fire-fighting activities;
2. Fire hydrant flushings;
3. Waters used to wash vehicles where detergents are not used;
4. Water used to control dust in accordance with Subpart 3.4.G;
5. Potable water including uncontaminated water line flushings;
6. Routine external building wash down that does not use detergents;
7. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
8. Uncontaminated air conditioning or compressor condensate;
9. Uncontaminated ground water or spring water;
10. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
11. Uncontaminated excavation dewatering;
12. Landscape irrigation.

C. Limitations on Coverage

1. This permit does not authorize post-construction discharges that originate from the site after construction activities have been completed and the site has achieved final stabilization, including any temporary support activity. Post-construction storm water discharges from industrial sites may need to be covered by a separate NPDES permit.
2. This permit does not authorize discharges mixed with non-storm water. This exclusion does not apply to discharges identified in Subpart 1.3.B, provided the discharges are in compliance with Subpart 3.5 (Non-Storm Water Discharge Management).
3. This permit does not authorize storm water discharges associated with construction activity that have been covered under an individual permit or required to obtain coverage under an alternative general permit in accordance with Subpart 4.2.
4. This permit does not authorize discharges that EPA, prior to authorization under this permit, determines will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard. Where such a determination is made prior to authorization, EPA may notify you that an individual permit application is necessary in accordance with Subpart 4.2. However, EPA may authorize your coverage under this permit after you have included appropriate controls and implementation procedures in your SWPPP designed to bring your discharge into compliance with water quality standards.
5. *Discharging into Receiving Waters With an Approved Total Maximum Daily Load Analysis*
   a. You are not eligible for coverage under this permit for discharges of pollutants of concern to waters for which there is a total maximum daily load (TMDL) established or approved by EPA unless you incorporate into your SWPPP measures or controls that are consistent with the assumptions and requirements of such TMDL. To be eligible for coverage under this general permit, you must incorporate into your SWPPP any conditions applicable to your discharges necessary for consistency with the assumptions and requirements of such TMDL. If a specific wasteload allocation has been established that would apply to your discharge, you must incorporate that allocation into your SWPPP and implement necessary steps to meet that allocation.
   b. In a situation where an EPA-approved or established TMDL has specified a general wasteload allocation applicable to construction storm water discharges, but no specific requirements for construction sites have been identified in the TMDL, you should consult with the State or Federal TMDL authority to confirm that adherence to a SWPPP that meets the requirements of the CGP will be consistent with the approved TMDL. Where an EPA-approved or established TMDL has not

specified a wasteload allocation applicable to construction storm water discharges, but has not specifically excluded these discharges, adherence to a SWPPP that meets the requirements of the CGP will generally be assumed to be consistent with the approved TMDL. If the EPA-approved or established TMDL specifically precludes such discharges, the operator is not eligible for coverage under the CGP.

6. *Endangered and Threatened Species and Critical Habitat Protection*

   a. Coverage under this permit is available only if your storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities, as defined in Appendix A, are not likely to jeopardize the continued existence of any species that are federally-listed as endangered or threatened ("listed") under the Endangered Species Act (ESA) or result in the adverse modification or destruction of habitat that is federally-designated as critical under the ESA ("critical habitat").

   b. You are not eligible to discharge if the storm water discharges, allowable non-storm water discharges, or storm water discharge-related activities would cause a prohibited "take" of federally-listed endangered or threatened species (as defined under section 3 of the ESA and 50 CFR 17.3), unless such takes are authorized under sections 7 or 10 of the ESA.

   c. Determining Eligibility: You must use the process in Appendix C (ESA Review Procedures) to determine eligibility *PRIOR* to submittal of the Notice of Intent (NOI). You must meet one or more of the following six criteria (A-F) for the entire term of coverage under the permit:

Criterion A. No federally-listed threatened or endangered species or their designated critical habitat are in the project area as defined in Appendix C; or

Criterion B. Formal consultation with the Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the ESA has been concluded and that consultation:

i. Addressed the effects of the project's storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities on federally-listed threatened or endangered species and federally-designated critical habitat, and

ii. The consultation resulted in either:

a. Biological opinion finding no jeopardy to federally-listed species or destruction/adverse modification of federally-designated critical habitat, or

b. written concurrence from the Service(s) with a finding that the storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities are not likely to adversely affect federally-listed species or federally-designated critical habitat; or

Criterion C. Informal consultation with the Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the ESA has been concluded and that consultation:

i. Addressed the effects of the project's storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities on federally-listed threatened or endangered species and federally-designated critical habitat, and

ii. The consultation resulted in either:

a. Biological opinion finding no jeopardy to federally-listed species or destruction/adverse modification of federally-designated critical habitat, or

b. written concurrence from the Service(s) with a finding that the storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities are not likely to adversely affect federally-listed species or federally-designated critical habitat; or

Criterion D. The construction activities are authorized through the issuance of a permit under section 10 of the ESA, and that authorization addresses the effects of the storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities on federally-listed species and federally-designated critical habitat; or

Criterion E. Storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities are not likely to adversely affect any federally-listed

threatened or endangered species or result in the destruction or adverse modification of federally-designated critical habitat; or

Criterion F. The project's storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities were already addressed in another operator's valid certification of eligibility under Criteria A-E which included your construction activities and there is no reason to believe that federally-listed species or federally-designated critical habitat not considered in the prior certification may be present or located in the project area. By certifying eligibility under this criterion, you agree to comply with any measures or controls upon which the other operator's certification was based.

You must comply with any applicable terms, conditions, or other requirements developed in the process of meeting the eligibility requirements of the criteria in this section to remain eligible for coverage under this permit. Such terms and conditions must be documented and incorporated into your SWPPP.

7. Historic Properties

[Reserved]

You are reminded that you must comply with applicable state, tribal and local laws concerning the protection of historic properties and places.

1.4 Waivers for Certain Small Construction Activities

Three scenarios exist under which small construction activities (see definition in Appendix A) may be waived from the NPDES permitting requirements detailed in this general permit. These exemptions are predicated on certain criteria being met and proper notification procedures being followed. Details of the waiver options and procedures for requesting a waiver are provided in Appendix D.

PART 2: AUTHORIZATION FOR DISCHARGES OF STORM WATER FROM CONSTRUCTION ACTIVITY

To obtain coverage under this general permit, you, the operator, must prepare and submit a complete and accurate Notice of Intent (NOI), as described in this Part. Discharges are not authorized if your NOI is incomplete or inaccurate or if you were never eligible for permit coverage.

2.1 Authorization to Discharge Date

This permit is effective as of the publication date in the Federal Register and is effective for five years, expiring at midnight on the anniversary of publication in the fifth year.

A. If you submit an NOI during the first 90 days after the issuance date of this permit you are authorized to discharge storm water from construction activities under the terms and conditions of this permit seven (7) calendar days after submittal to EPA of a complete and accurate NOI (i.e., 7 days from date of postmark), except as noted in Subpart 2.1.C.

B. If you submit an NOI after the first 90 days of this permit and prior to the expiration date of this permit, you are authorized to discharge storm water from construction activities under the terms and conditions of this permit seven (7) calendar days after acknowledgment of receipt of your complete NOI is posted on EPA's NPDES website ***http://www.epa.gov/npdes/stormwater/cgp***, except as noted in Subpart 2.1.C.

C. EPA may delay your authorization based on eligibility considerations of Subpart 1.3 (e.g., ESA concerns). In these instances, you are not authorized for coverage under this permit until you receive notice from EPA of your eligibility.

2.2 Notice of Intent Contents

A. You must use the NOI form provided in Appendix E (or a photocopy thereof) and available at www.epa.gov/npdes/stormwater/cgp. If EPA makes other NOI forms available (either directly, by public notice, or by making information available on the Internet), you may take advantage of any of those options to satisfy the NOI use requirements of this Subpart.

B. You must provide the following information on the NOI form:

1. The applicable permit number for which you are requesting coverage (See Appendix B);

2. Operator name, address, telephone number, and Employer Identification Number (EIN) as established by the U.S. Internal Revenue Service;
3. Project/Site name, address, county or similar governmental subdivision, and latitude/longitude of your construction project or site;
4. Whether your site is located in Indian country and if so, the name of the Reservation, if applicable;
5. Whether the SWPPP has been prepared in advance of filing of this NOI and the location where the applicable SWPPP may be viewed;
6. Name of the water(s) of the U.S. into which your site discharges;
7. Indication whether your discharge is consistent with the assumptions and requirements of applicable EPA approved or established TMDLs;
8. Estimated dates of commencement of construction activity and final stabilization (i.e., project start and completion dates);
9. Total acreage (to the nearest quarter acre) to be disturbed for which you are requesting permit coverage;
10. Whether any federally-listed threatened or endangered species, or federally-designated critical habitat are in your project area to be covered by this permit, and the basis for certifying eligibility for permit coverage based on the instructions in Appendix C;
11. A certification statement, signed and dated by an authorized representative as defined in Appendix G, Section 11, and the name and title of that authorized representative.

2.3 Submission Deadlines

A. *New Projects:* To obtain coverage under this permit, you must submit a complete and accurate NOI and be authorized consistent with Subpart 2.1 prior to your commencement of construction activities.

B. *Permitted Ongoing Projects (only applicable for first 90 days after this permit is issued):* If you previously received authorization to discharge for your project under the 1998 CGP and you wish to continue coverage under this permit:

1. Except as noted in 2.3.B.2, you must:
    1. Submit an NOI within 90 days of the issuance date of this permit, and
    2. Until you are authorized under this permit consistent with Subpart 2.1, comply with the terms and conditions of the 1998 CGP under which you were previously authorized.
2. If you meet the termination of coverage requirements in accordance with Subpart 5.1 within 90 days of the issuance date of this permit (e.g., construction will be finished and final stabilization achieved) you must:
    1. Submit an NOT consistent with the 2003 CGP using the NOT form provided in Appendix F, and
    2. Until coverage is no longer required, comply with the terms and conditions of the 1998 CGP under which you were previously authorized.

C. *Unpermitted Ongoing Projects (only applicable for first 90 days after this permit is issued):* If you previously did not receive authorization to discharge for your project under the 1998 CGP and you wish to obtain coverage under this permit:

1. Except as noted in 2.3.C.2, you must:
    1. Submit an NOI within 90 days of the issuance date of this permit, and
    2. Until you are authorized under this permit consistent with Subpart 2.1, comply with an interim Storm Water Pollution Prevention Plan (SWPPP) consistent with the 1998 CGP.
2. If you meet the termination of coverage requirements in accordance with Subpart 5.1 within 90 days of the issuance date of this permit (e.g., construction will be finished and final stabilization achieved) you must comply with an interim Storm Water Pollution Prevention Plan (SWPPP) consistent with the 1998 CGP until permit coverage is no longer required.

D. *Late Notifications:* Operators are not prohibited from submitting NOIs after initiating clearing, grading, excavation activities, or other construction activities. When a late NOI is submitted, authorization for discharges occurs consistent with Subpart 2.1. The Agency reserves the right to take enforcement action for any unpermitted discharges that occur between the commencement of construction and discharge authorization.

2.4 Where to Submit

A. Except as noted in Subpart 2.3.B, you must send your complete and accurate NOI to EPA at one of the following addresses:

For Regular U.S. Mail Delivery:
EPA Storm Water Notice Processing Center
Mail Code 4203M
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

For Overnight/Express Mail Delivery:
EPA Storm Water Notice Processing Center
Room 7420
U.S. EPA
1201 Constitution Avenue, NW
Washington, DC 20004

B. In lieu of Subpart 2.4.A, when available, you may submit your NOI using EPA's electronic NOI system (i.e., eNOI) as detailed at www.epa.gov/npdes/stormwater/cgp.

PART 3: STORM WATER POLLUTION PREVENTION PLANS (SWPPPS)

3.1 Storm Water Pollution Prevention Plan Framework

A. A SWPPP must be prepared prior to submission of an NOI as required in Part 2. At least one SWPPP must be developed for each construction project covered by this permit and such SWPPP must be prepared in accordance with good engineering practices.

B. The SWPPP must:

1. Identify all potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site;
2. Describe practices to be used to reduce pollutants in storm water discharges from the construction site; and
3. Assure compliance with the terms and conditions of this permit.

C. Once a definable area has been finally stabilized, you may mark this on your SWPPP and no further SWPPP or inspection requirements apply to that portion of the site (e.g., earth-disturbing activities around one of three buildings in a complex are done and the area is finally stabilized, one mile of a roadway or pipeline project is done and finally stabilized, etc).

D. You must implement the SWPPP as written from commencement of construction activity until final stabilization is complete.

3.2 Requirements for Different Types of Operators

You may meet one or both of the operational control components in the definition of operator found in Appendix A. Subpart 3.2.C applies to all permittees having control over only a portion of a construction site.

A. If you have operational control over construction plans and specifications, you must ensure that:

1. The project specifications meet the minimum requirements of this Subpart and all other applicable permit conditions;
2. The SWPPP indicates the areas of the project where the operator has operational control over project specifications, including the ability to make modifications in specifications;
3. All other permittees implementing portions of the SWPPP (or their own SWPPP) who may be impacted by a change to the construction plan are notified of such changes in a timely manner; and
4. The SWPPP indicates the name of the party(ies) with day-to-day operational control of those activities necessary to ensure compliance with the SWPPP or other permit conditions.

B. If you have operational control over day-to-day activities, you must ensure that:

1. The SWPPP meets the minimum requirements of this Subpart and identifies the parties responsible for implementation of control measures identified in the plan;
2. The SWPPP indicates areas of the project where you have operational control over day-to-day activities;
3. The SWPPP indicates the name of the party(ies) with operational control over project specifications (including the ability to make modifications in specifications).

C. If you have operational control over only a portion of a larger project (e.g., one of four homebuilders in a subdivision), you are responsible for compliance with all applicable terms and conditions of this permit as it relates to your activities on your portion of the construction site, including protection of endangered species, critical habitat, and historic properties, and implementation of best management practices (BMPs) and other controls required by the SWPPP. You must ensure either directly or through coordination with other permittees, that your activities do not render another party's pollution control ineffective. You must either implement your portion of a common SWPPP or develop and implement your own SWPPP.

For more effective coordination of BMPs and opportunities for cost sharing, a cooperative effort by the different operators at a site to prepare and participate in a comprehensive SWPPP is encouraged. Individual operators at a site may, but are not required to, develop separate SWPPPs that cover only their portion of the project provided reference is made to other operators at the site. In instances where there is more than one SWPPP for a site, cooperation between the permittees is encouraged to ensure the storm water discharge controls and other measures are consistent with one another (e.g., provisions to protect listed species and critical habitat).

3.3 Pollution Prevention Plan Contents: Site and Activity Description

A. The SWPPP must identify all operators for the project site, and the areas of the site over which each operator has control.

B. The SWPPP must describe the nature of the construction activity, including:

1. The function of the project (e.g., low density residential, shopping mall, highway, etc.);
2. The intended sequence and timing of activities that disturb soils at the site;
3. Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities, including dedicated off-site borrow and fill areas; and
4. A general location map (e.g., USGS quadrangle map, a portion of a city or county map, or other map) with enough detail to identify the location of the construction site and waters of the United States within one mile of the site.

C. The SWPPP must contain a legible site map, showing the entire site, identifying:

1. Direction(s) of storm water flow and approximate slopes anticipated after major grading activities;
2. Areas of soil disturbance and areas that will not be disturbed;
3. Locations of major structural and nonstructural BMPs identified in the SWPPP;
4. Locations where stabilization practices are expected to occur;
5. Locations of off-site material, waste, borrow or equipment storage areas;
6. Locations of all waters of the United States (including wetlands);
7. Locations where storm water discharges to a surface water; and
8. Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

D. The SWPPP must describe and identify the location and description of any storm water discharge associated with industrial activity other than construction at the site. This includes storm water discharges from dedicated asphalt plants and dedicated concrete plants, that are covered by this permit.

3.4 Pollution Prevention Plan Contents: Controls to Reduce Pollutants

A. The SWPPP must include a description of all pollution control measures (i.e., BMPs) that will be implemented as part of the construction activity to control pollutants in storm water discharges. For each major activity identified in the project description the SWPPP must clearly describe appropriate control measures, the general sequence during the construction process in which the measures will be implemented, and which operator is responsible for the control measure's implementation.

B. The SWPPP must include a description of interim and permanent stabilization practices for the site, including a schedule of when the practices will be implemented. Site plans should ensure that existing vegetation is preserved where possible and that disturbed portions of the site are stabilized. Use of impervious surfaces for stabilization should be avoided.

C. The following records must be maintained as part of the SWPPP:

   1. Dates when major grading activities occur;
   2. Dates when construction activities temporarily or permanently cease on a portion of the site; and
   3. Dates when stabilization measures are initiated.

D. The SWPPP must include a description of structural practices to divert flows from exposed soils, retain/detain flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Placement of structural practices in floodplains must be avoided to the degree practicable.

E. The SWPPP must include a description of all post-construction storm water management measures that will be installed during the construction process to control pollutants in storm water discharges after construction operations have been completed. Structural measures should be placed on upland soils to the degree practicable. Such measures must be designed and installed in compliance with applicable federal, local, state or tribal requirements.

F. The SWPPP must describe measures to prevent the discharge of solid materials, including building materials, to waters of the United States, except as authorized by a permit issued under section 404 of the CWA.

G. The SWPPP must describe measures to minimize, to the extent practicable, off-site vehicle tracking of sediments onto paved surfaces and the generation of dust.

H. The SWPPP must include a description of construction and waste materials expected to be stored on-site with updates as appropriate. The SWPPP must also include a description of controls, including storage practices, to minimize exposure of the materials to storm water, and spill prevention and response practices.

I. The SWPPP must include a description of pollutant sources from areas other than construction (including storm water discharges from dedicated asphalt plants and dedicated concrete plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.

3.5 Non-Storm Water Discharge Management

The SWPPP must identify all allowable sources of non-storm water discharges listed in Subpart 1.3.B of this permit, except for flows from fire fighting activities, that are combined with storm water discharges associated with construction activity at the site. Non-storm water discharges should be eliminated or reduced to the extent feasible. The SWPPP must identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

3.6 Maintenance of Controls

A. All erosion and sediment control measures and other protective measures identified in the SWPPP must be maintained in effective operating condition. If site inspections required by Subpart 3.10 identify BMPs that are not operating effectively, maintenance must be performed as soon as possible and before the next storm event whenever practicable to maintain the continued effectiveness of storm water controls.

B. If existing BMPs need to be modified or if additional BMPs are necessary for any reason, implementation must be completed before the next storm event whenever practicable. If implementation before the next storm event is impracticable, the situation must be documented in the SWPPP and alternative BMPs must be implemented as soon as possible.

C. Sediment from sediment traps or sedimentation ponds must be removed when design capacity has been reduced by 50 percent.

3.7 Documentation of Permit Eligibility Related to Endangered Species

The SWPPP must include documentation supporting a determination of permit eligibility with regard to Endangered Species, including:

A. Information on whether federally-listed endangered or threatened species, or federally-designated critical habitat may be in the project area;

B. Whether such species or critical habitat may be adversely affected by storm water discharges or storm water discharge-related activities from the project;

C. Results of the Appendix C listed species and critical habitat screening determinations;

D. Confirmation of delivery of NOI to EPA or to EPA's electronic NOI system. This may include an overnight, express or registered mail receipt acknowledgment; or electronic acknowledgment from EPA's electronic NOI system.

E. Any correspondence for any stage of project planning between the U.S. Fish and Wildlife Service (FWS), EPA, the U.S. National Marine Fisheries Service (NMFS), or others and you regarding listed species and critical habitat, including any notification that delays your authorization to discharge under this permit;

F. A description of measures necessary to protect federally-listed endangered or threatened species, or federally-designated critical habitat. The permittee must describe and implement such measures to maintain eligibility for coverage under this permit.

3.8 Copy of Permit Requirements

Copies of this permit and of the signed and certified NOI form that was submitted to EPA must be included in the SWPPP. Also, upon receipt, a copy of the letter from the EPA Storm Water Notice Processing Center notifying you of their receipt of your administratively complete NOI must also be included as a component of the SWPPP.

3.9 Applicable State, Tribal, or Local Programs

The SWPPP must be consistent with all applicable federal, state, tribal, or local requirements for soil and erosion control and storm water management, including updates to the SWPPP as necessary to reflect any revisions to applicable federal, state, tribal, or local requirements for soil and erosion control.

3.10 Inspections

A. Inspections must be conducted in accordance with one of the two schedules listed below. You must specify in your SWPPP which schedule you will be following.

   1. At least once every 7 calendar days, OR
   2. At least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

B Inspection frequency may be reduced to at least once every month if:

   1. The entire site is temporarily stabilized,
   2. Runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or the ground is frozen), or
   3. Construction is occurring during seasonal arid periods in arid areas and semi-arid areas.

C. A waiver of the inspection requirements is available until one month before thawing conditions are expected to result in a discharge if all of the following requirements are met:

   1. The project is located in an area where frozen conditions are anticipated to continue for extended periods of time (i.e., more than one month);
   2. Land disturbance activities have been suspended; and
   3. The beginning and ending dates of the waiver period are documented in the SWPPP.

D. Inspections must be conducted by qualified personnel (provided by the operator or cooperatively by multiple operators). "Qualified personnel" means 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.

E. Inspections must include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors must look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Sedimentation and erosion control measures identified in the SWPPP must be observed to ensure proper operation. Discharge locations must be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to waters of the United States, where accessible. Where discharge locations are inaccessible, nearby downstream locations must be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

F. Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may limit the access of inspection personnel to the areas described in Subpart 3.10.E above. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls must be inspected on the same frequencies as other construction projects, but representative inspections may be performed. For representative inspections, personnel must inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. The conditions of the controls along each inspected 0.25 mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile segment to either the end of the next 0.25 mile inspected segment, or to the end of the project, whichever occurs first.

G. For each inspection required above, you must complete an inspection report. At a minimum, the inspection report must include:

1. The inspection date;
2. Names, titles, and qualifications of personnel making the inspection;
3. Weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
4. Weather information and a description of any discharges occurring at the time of the inspection;
5. Location(s) of discharges of sediment or other pollutants from the site;
6. Location(s) of BMPs that need to be maintained;
7. Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
8. Location(s) where additional BMPs are needed that did not exist at the time of inspection; and
9. Corrective action required including any changes to the SWPPP necessary and implementation dates.

A record of each inspection and of any actions taken in accordance with this Part must be retained as part of the SWPPP for at least three years from the date that permit coverage expires or is terminated. The inspection reports must identify any incidents of non-compliance with the permit conditions. Where a report does not identify any incidents of non-compliance, the report must contain a certification that the construction project or site is in compliance with the SWPPP and this permit. The report must be signed in accordance with Appendix G, Section 11 of this permit.

3.11 Maintaining an Updated Plan

A. The SWPPP, including the site map, must be amended whenever there is a change in design, construction, operation, or maintenance at the construction site that has or could have a significant effect on the discharge of pollutants to the waters of the United States that has not been previously addressed in the SWPPP.

B. The SWPPP must be amended if during inspections or investigations by site staff, or by local, state, tribal or federal officials, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site.

C. Based on the results of an inspection, the SWPPP must be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP must be completed within

seven (7) calendar days following the inspection. Implementation of these additional or modified BMPs must be accomplished as described in Subpart 3.6.B.

3.12 Signature, Plan Review and Making Plans Available

A. A copy of the SWPPP (including a copy of the permit), NOI, and acknowledgement letter from EPA must be retained at the construction site (or other location easily accessible during normal business hours to EPA, a state, tribal or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service) from the date of commencement of construction activities to the date of final stabilization. If you have day-to-day operational control over SWPPP implementation, you must have a copy of the SWPPP available at a central location on-site for the use of all those identified as having responsibilities under the SWPPP whenever they are on the construction site. If an on-site location is unavailable to store the SWPPP when no personnel are present, notice of the plan's location must be posted near the main entrance at the construction site.

B. A sign or other notice must be posted conspicuously near the main entrance of the construction site. If displaying near the main entrance is infeasible, the notice can be posted in a local public building such as the town hall or public library. The sign or other notice must contain the following information:

   1. A copy of the completed Notice of Intent as submitted to the EPA Storm Water Notice Processing Center; and

   2. If the location of the SWPPP or the name and telephone number of the contact person for scheduling SWPPP viewing times has changed (i.e., is different than that submitted to EPA in the NOI), the current location of the SWPPP and name and telephone number of a contact person for scheduling viewing times.

   For linear projects, the sign or other notice must be posted at a publicly accessible location near the active part of the construction project (e.g., where a pipeline project crosses a public road).

C. SWPPPs must be made available upon request by EPA; a state, tribal or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to the requestor. The copy of the SWPPP that is required to be kept on-site or locally available must be made available, in its entirety, to the EPA staff for review and copying at the time of an on-site inspection.

D. All SWPPPs must be signed and certified in accordance with Appendix G, Section 11.

3.13 Management Practices

A. All control measures must be properly selected, installed, and maintained in accordance with any relevant manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately, or incorrectly, the operator must replace or modify the control for site situations as soon as practicable.

B. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts.

C. Litter, construction debris, and construction chemicals that could be exposed to storm water must be prevented from becoming a pollutant source in storm water discharges.

D. Except as provided below, stabilization measures must be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

   1. Where stabilization by the 14th day is precluded by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practicable.

   2. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 14 days, temporary stabilization measures do not have to be initiated on that portion of the site.

3. In arid, semiarid, and drought-stricken areas where initiating perennial vegetative stabilization measures is not possible within 14 days after construction activity has temporarily or permanently ceased, final vegetative stabilization measures must be initiated as soon as practicable.

E. A combination of sediment and erosion control measures are required to achieve maximum pollutant removal.

1. Sediment Basins: For common drainage locations that serve an area with 10 or more acres disturbed at one time, a temporary (or permanent) sediment basin that provides storage for a calculated volume of runoff from the drainage area from a 2-year, 24-hour storm, or equivalent control measures, must be provided where attainable until final stabilization of the site. Where no such calculation has been performed, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, must be provided where attainable until final stabilization of the site. When computing the number of acres draining into a common location, it is not necessary to include flows from offsite areas and flows from on-site areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. In determining whether installing a sediment basin is attainable, the operator may consider factors such as site soils, slope, available area on-site, etc. In any event, the operator must consider public safety, especially as it relates to children, as a design factor for the sediment basin, and alternative sediment controls must be used where site limitations would preclude a safe design.
2. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin or equivalent controls is not attainable, smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions).
3. For drainage locations serving less than 10 acres, smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless a sediment basin providing storage for a calculated volume of runoff from a 2-year, 24-hour storm or 3,600 cubic feet of storage per acre drained is provided.

F. Velocity dissipation devices must be placed at discharge locations and along the length of any outfall channel to provide a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water).

3.14 Documentation of Permit Eligibility Related to Total Maximum Daily Loads

The SWPPP must include documentation supporting a determination of permit eligibility with regard to waters that have an EPA-established or approved TMDL, including:

A. Identification of whether your discharge is identified, either specifically or generally, in an EPA-established or approved TMDL and any associated allocations, requirements, and assumptions identified for your discharge;

B. Summaries of consultation with State or Federal TMDL authorities on consistency of SWPPP conditions with the approved TMDL, and

C. Measures taken by you to ensure that your discharge of pollutants from the site is consistent with the assumptions and requirements of the EPA-established or approved TMDL, including any specific wasteload allocation that has been established that would apply to your discharge.

See section 1.3.C.5 for further information on determining permit eligibility related to TMDLs.

PART 4: SPECIAL CONDITIONS, MANAGEMENT PRACTICES AND OTHER NON-NUMERIC LIMITATIONS

4.1 Continuation of the Expired General Permit

If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedure Act and remain in force and effect. If you were granted permit coverage prior to the expiration date, you will automatically remain covered by the continued permit until the earliest of:

A. Reissuance or replacement of this permit, at which time you must comply with the conditions of the new permit to maintain authorization to discharge; or

B. Your submittal of a Notice of Termination; or

C. Issuance of an individual permit for the project's discharges; or

D. A formal permit decision by EPA to not reissue this general permit, at which time you must seek coverage under an alternative general permit or an individual permit.

4.2 Requiring an Individual Permit or an Alternative General Permit

A. EPA may require you to apply for and/or obtain either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition EPA to take action under this paragraph. If EPA requires you to apply for an individual NPDES permit, EPA will notify you in writing that a permit application is required. This notification will include a brief statement of the reasons for this decision and an application form. In addition, if you are an existing permittee covered under this permit, the notice will set a deadline to file the application, and will include a statement that on the effective date of issuance or denial of the individual NPDES permit or the alternative general permit as it applies to you, coverage under this general permit will automatically terminate. Applications must be submitted to EPA at the applicable EPA Regional offices listed in Appendix B of this permit. EPA may grant additional time to submit the application upon your request. If you are covered under this permit and you fail to submit in a timely manner an individual NPDES permit application as required by EPA, then the applicability of this permit to you is automatically terminated at the end of the day specified by EPA as the deadline for application submittal.

B. You may request to be excluded from the coverage of this general permit by applying for an individual permit. In such a case, you must submit an individual application in accordance with the requirements of 40 CFR §122.26(c)(1)(ii), with reasons supporting the request, to EPA at the applicable EPA Regional office listed in Appendix B of this permit. The request may be granted by issuance of an individual permit or an alternative general permit if your reasons are adequate to support the request.

C. When an individual NPDES permit is issued to you, who are otherwise subject to this permit, or you are authorized to discharge under an alternative NPDES general permit, the applicability of this permit to you is automatically terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. If you, who are otherwise subject to this permit, are denied an individual NPDES permit or an alternative NPDES general permit, the applicability of this permit to you is automatically terminated on the date of such denial, unless otherwise specified by EPA.

4.3 Releases in Excess of Reportable Quantities

The discharge of hazardous substances or oil in storm water discharges from the construction site must be prevented or minimized in accordance with the SWPPP. This permit does not relieve you of the federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117 and 40 CFR Part 302 relating to spills or other releases of oils or hazardous substances.

Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a 24-hour period:

- you must provide notice to the National Response Center (NRC) (800–424–8802; in the Washington, DC, metropolitan area call 202–426–2675) in accordance with the requirements of 40 CFR Part 110, 40 CFR Part 117 and 40 CFR Part 302 as soon as site staff have knowledge of the discharge; and
- you must modify the SWPPP as required under Subpart 3.11 within 7 calendar days of knowledge of the release to: provide a description of the release, the circumstances leading to the release, and the date of the release. Plans must identify measures to prevent the reoccurrence of such releases and to respond to such releases.

4.4 Spills

This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill.

4.5 Attainment of Water Quality Standards After Authorization

A. You must select, install, implement and maintain BMPs at your construction site that minimize pollutants in the discharge as necessary to meet applicable water quality standards. In general, except in situations explained in Subpart 4.5.B below, your SWPPP developed, implemented, and updated consistent with Part 3.0 is considered as stringent as necessary to ensure that your discharges do not cause or contribute to an excursion above any applicable water quality standard.

B. At any time after authorization, EPA may determine that your storm water discharges may cause, have reasonable potential to cause, or contribute to an excursion above any applicable water quality standard. If such a determination is made, EPA will require you to:

   i. Develop a supplemental BMP action plan describing SWPPP modifications in accordance with Subpart 3.11 to address adequately the identified water quality concerns;

   ii. Submit valid and verifiable data and information that are representative of ambient conditions and indicate that the receiving water is attaining water quality standards; or

   iii. Cease discharges of pollutants from construction activity and submit an individual permit application according to Subpart 4.2.

   All written responses required under this part must include a signed certification consistent with Appendix G, Section 11.

PART 5: TERMINATION OF COVERAGE

5.1 Requirements

You may only submit a Notice of Termination (NOT) after one or more of the following conditions have been met:

A. Final stabilization has been achieved on all portions of the site for which you are responsible;

B. Another operator has assumed control according to Appendix G, Section 11.C over all areas of the site that have not been finally stabilized;

C. Coverage under an individual or alternative general NPDES permit has been obtained; or

D. For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

The NOT must be submitted within 30 days of one of the above conditions being met. Authorization to discharge terminates at midnight of the day the NOT is signed.

5.2 Submitting a Notice of Termination

It is your responsibility to submit a complete and accurate Notice of Termination (NOT), using the form provided in Appendix F (or a photocopy thereof) available at www.epa.gov/npdes/stormwater/cgp. If EPA notifies dischargers (either directly, by public notice, or by making information available on the Internet) of other NOT form options (e.g., electronic submission), you may take advantage of those options to satisfy the requirements of Part 5.

A. The Notice of Termination must include the following information:

   1. The NPDES permit tracking number for the storm water discharge;

   2. The basis for submission of the NOT, including: final stabilization has been achieved on all portions of the site for which the permittee is responsible; another operator/permittee has assumed control over all areas of the site that have not been finally stabilized; coverage under an alternative NPDES permit has been obtained; or, for residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner;

   3. You, the operator's name, address, telephone number and your organization's Employer Identification Number (EIN) as established by the U.S. Internal Revenue Service;

   4. The name of the project and address (or a description of location if no street address is available) of the construction site for which the notification is submitted; and

   5. A certification statement, signed and dated by an authorized representative as defined in Appendix G, Section 11 and the name and title of that authorized representative.

5.3 Where to Submit

A. All NOTs must be submitted to one of the following addresses:

For Regular U.S. Mail Delivery:
EPA Storm Water Notice Processing Center
Mail Code 4203M
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

For Overnight/Express Mail Delivery:
EPA Storm Water Notice Processing Center
Room 7420
U.S. EPA
1201 Constitution Avenue, NW
Washington, DC 20004

B. In lieu of Subpart 5.3.A, you can submit your NOT to EPA using EPA's electronic system (i.e., eNOI), when available. Check www.epa.gov/npdes/stormwater/cgp for updates.

PART 6: RETENTION OF RECORDS

Copies of the SWPPP and all documentation required by this permit, including records of all data used to complete the NOI to be covered by this permit, must be retained for at least three years from the date that permit coverage expires or is terminated. This period may be extended by request of EPA at any time.

PART 7: REOPENER CLAUSE

7.1 Procedures for Modification or Revocation

Permit modification or revocation will be conducted according to 40 CFR §122.62, §122.63, §122.64 and §124.5.

7.2 Water Quality Protection

If there is evidence indicating that the storm water discharges authorized by this permit cause, have the reasonable potential to cause or contribute to an excursion above any applicable water quality standard, you may be required to obtain an individual permit in accordance with Part 4.5 of this permit, or the permit may be modified to include different limitations and/or requirements.

7.3 Timing of Permit Modification

EPA may elect to modify the permit prior to its expiration (rather than waiting for the new permit cycle) to comply with any new statutory or regulatory requirements, such as for effluent limitation guidelines, that may be promulgated in the course of the current permit cycle.

PART 8: STANDARD PERMIT CONDITIONS

The federal regulations require that the Standard Conditions provisioned at 40 CFR §122.41 be applied to all NPDES permits. You are required to comply with those Standard Conditions, details of which are provided in Appendix G.

PART 9: PERMIT CONDITIONS APPLICABLE TO SPECIFIC STATES, INDIAN COUNTRY, OR TERRITORIES

The provisions of this Part provide modifications or additions to the applicable conditions of this permit to reflect specific additional conditions required as part of the state or tribal CWA Section 401 certification process, or the Coastal Zone Management Act (CZMA) certification process, or as otherwise established by the permitting authority. The specific additional revisions and requirements only apply to activities in those specific states, Indian country, and federal facilities. States, Indian country, and federal facilities not included in this Part do not have any modifications or additions to the applicable conditions of this permit.

State Coastal Zone Management Act (CZMA) certification was not received from Massachusetts in time for that state to be included in this permit. As such, large construction activities in Massachusetts covered under the 1998 CGP will continue to be covered under that permit. EPA will reissue the CGP for Massachusetts for large and small construction activities at a later date, and will include any state-specific modifications or additions as part of the State's CZMA certification process.

A. Region 1

1. MAR100000: Commonwealth of Massachusetts, except Indian country

   a. State Water Quality Statutes, Regulations, and Policies:

      i. You must comply with the Massachusetts Clean Waters Act (Ch. 21, ss. 23-56).

      ii. You must comply with the conditions in 314 CMR 4.00 - Surface Water Quality Standards.

      iii. You must comply with the conditions in 314 CMR 3.00 - Surface Water Discharge Permit Program.

      iv. You must comply with the Wetlands Protection Act, Ch. 131, s. 40 and its regulations, 310 CMR 10.00 and any order of Conditions issued by a Conservation Commission or a Superseding Order of Conditions issued by the Massachusetts Department of Environmental Protection.

   b. Department of Environmental Protection Storm Water Management Policy:

      i. You must comply with the Massachusetts Storm Water Management Policy, March 1997 and applicable Storm Water Performance Standards, as prescribed by state regulations promulgated under the authority of the Massachusetts Clean Waters Act, MGL Ch. 21, ss. 23-56 and the Wetlands Protection Act Ch. 131, s. 40.

   c. Other State Environmental Laws, Regulations, Policies:

      i. You must comply with the Massachusetts Endangered Species Act [MESA] (MGL Ch. 313A and regulations at 321 CMR 10.00) and any actions undertaken to comply with this storm water permit, shall not result in non-compliance with the MESA.

      ii. You must not conduct activities under this permit that will interfere with implementation of mosquito control work conducted in accordance with Chapter 252 including, s. 5A thereunder and DEP Guideline Number BRP G01-02, West Nile Virus Application of Pesticides to Wetland Resource Areas and Buffer Zones, and Public Water Systems.

   d. Other Department Directives:

      i. The Department may require you to perform water quality monitoring during the permit term if monitoring is necessary for the protection of public health or the environment as designated under the authority at 314 CMR 3.00.

      ii. The Department may require you to provide measurable verification of the effectiveness of BMPs and other control measures in your management program, including water quality monitoring.

      iii. The Department has determined that compliance with this permit does not protect you from enforcement actions deemed necessary by the Department under its associated regulations to address an imminent threat to the public health or a significant adverse environmental impact which results in a violation of the Massachusetts Clean Waters Act, Ch. 21, ss. 26-53.

      iv. The Department reserves the right to modify the 401 Water Quality Certification if any changes, modifications or deletions are made to the general permit. In addition, the Department reserves the right to add and/or alter the terms and conditions of its 401 Water Quality Certification to carry out its responsibilities during the term of this permit with respect to water quality, including any revisions to 314 CMR 4.00, Surface Water Quality Standards.

   e. Permit Compliance

      i. Should any violation of the Massachusetts Surface Water Quality Standards (314 CMR 4.00) or the conditions of this certification occur, the Department will direct you to correct the violations(s). The Department has the right to take any action as authorized by the General Laws of the Commonwealth to address the violation of this permit or the MA Clean Waters Act and the regulations promulgated thereunder. Substantial civil and criminal penalties are authorized under MGL Ch. 21, s. 42 for discharging into Massachusetts' waters in violation of an order or permit issued by this Department. This certification does not relieve the you of the duty to comply with other applicable Massachusetts statutes and regulations.

2. NHR100000: State of New Hampshire

   a. If you disturb 100,000 square feet or more of contiguous area, you must also apply for a "Significant Alteration of the Terrain Permit from DES pursuant to RSA 485-A:17 and Env-Ws 415. This requirement

applies to the disturbances of only 50,000 square feet when construction occurs within the protected shoreline (see RSA 483-B and Env-Ws 1400).

b. You must determine that any excavation dewatering discharges are not contaminated before they will be authorized as an allowable non-storm water discharge under this permit (see Subpart 1.3.B). The water is considered uncontaminated if there is no groundwater contamination within 1,000 feet of the discharge. Information on groundwater contamination can be generated over the Internet via the NHDES web site www.des.state.nh.us (One Stop Data Retrieval, Onestop Master Site Table). The web site also provides E-mail access to an NHDES Site Remediation Contact to answer questions about using the Web site.

c. You must treat any uncontaminated excavation dewatering discharges as necessary to remove suspended solids and turbidity. The discharges must be sampled at a location prior to mixing with storm water at least once per week during weeks when discharges occur. The samples must be analyzed for total suspended solids (TSS) and must meet monthly average and maximum daily TSS limitations of 50 milligrams per liter (mg/L) and 100 mg/L, respectively. TSS (a.k.a. Residue, Nonfilterable) analysis and sampling must be performed in accordance with Tables IB (parameter, units and method) and II (required containers, preservation techniques and holding times) in 40 CFR 136.3 (see: http://www.access.gpo.gov/nara/cfr/waisidx_02/40cfr136_02.html). Records of any sampling and analysis must be maintained and kept with the SWPPP for at least three years after final site stabilization.

d. During site design and preparation of the storm water pollution prevention plan (SWPPP), you must consider opportunities for groundwater recharge using on-site infiltration. The SWPPP must include a description of any on-site infiltration that will be installed as a post construction storm water management measure (see Subpart 3.4.E) or reasons for not employing such measures. For design considerations for infiltration measures see the September 2001 DES publication titled "Managing Storm Water as a Valuable Resource" which is available online at: www.des.state.nh.us/StormWater/construction.htm. Loss of annual recharge to groundwater should be minimized through the use of infiltration measures wherever feasible.

B. Region 2

1. NYR10000I: Indian country within the State of New York

St. Regis Mohawk Territory at Akwesasne

a. NOIs shall also be submitted to the St. Regis Mohawk Tribe, Environment Division, at the same time they are submitted to EPA, at the following address:

St. Regis Mohawk Tribe, Environment Division
412 State Route 37
Akwesasne, NY 13655
Attn: Clean Water Program Manager.

b. In addition, Storm Water Pollution Prevention Plans (and any updates or amendments thereto) must be submitted to the Environment Division and to the Tribal Historic Preservation Officer at least thirty (30) days in advance of corresponding Notices of Intent. This will allow the Environment Division and the THPO to make an informed determination as to whether any proposed discharges might adversely impact the quality of its surface or groundwater, or disturb sites of historic or cultural significance to the Tribe that may be listed, or eligible to be listed, on the National Register of Historic Places.

c. Within 10 days of the inspection required under Subpart 3.10.G of this permit, the permittee shall provide a copy of the Inspection Report to the Environment Division.

C. Region 6

1. NMR150000: The State of New Mexico, except Indian country

NOTE: Conditions in the New Mexico Environment Department (NMED) certification of the permit resulted in permit requirements adding further restrictions on eligibility for discharges to Outstanding National Resource Waters (ONRWs), expanding on requirements for pollution prevention plans, and limiting options provided in the permit related to inspection frequency and final stabilization.

a. In addition to all other provisions of this permit, operators who intend to obtain authorization under this permit for all new storm water discharges must satisfy the conditions in Subpart 9.C.1.a.i, unless a TMDL has been established for the receiving stream which specifies a waste load allocation (WLA) for

construction storm water discharges or the receiving stream is a Tier 3 water, in which case Subpart 9.C.1.a.ii applies.

i. The operator must include a Sediment Control Plan (SCP) as a part of the Storm Water Pollution Prevention Plan (SWPPP). The SCP must include site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control BMPs and/or other controls that are designed to prevent an increase in the sediment yield and flow velocity from pre-construction, undisturbed conditions. This applies to discharges both during construction and after construction operations have been completed. The SCP must identify, and document the rationale for selecting these BMPs and/or other controls. The SCP must also describe design specifications, construction specifications, maintenance schedules (including a long term maintenance plan), criteria for inspections, as well as expected performance and longevity of the BMPs. Using appropriate soil loss prediction models (such as SEDCAD 4.0, RUSLE, SEDIMONT II, MULTISED, etc.), the operator(s) must demonstrate, and include documentation in the SCP, that implementation of the site-specific practices will result in sediment yields that will not be greater than the sediment yield levels from pre-construction, undisturbed conditions. The SCP must be prepared in accordance with good engineering practices and certified by a registered professional engineer. The operator(s) must design, implement, and maintain BMPs in the manner specified in the SCP and the SWPPP.

ii. Operators are not eligible to obtain authorization under this permit for all new storm water discharges to outstanding national resource waters (ONRWs) (also referred to as "Tier 3: waters). According to the Antidegradation Policy at Paragraph 3 of Subsection A of 20.6.4.8 NMAC, in part, "ONRWs may include, but are not limited to, surface waters of the state within national and state monuments, parks, wildlife refuges, waters of exceptional recreational or ecological significance, and waters identified under the Wild and Scenic Rivers Act." No ONRWs exist at the time this permit is being finalized; however, during the term of the permit, if a receiving water is designated as an ONRW, the operator must obtain an individual permit for storm water discharges from large and small construction activities.

b. Storm water discharges associated with industrial activity to Clean Water Act section 303(d) waters as well as all other "waters of the State" that the New Mexico Environment Department, Surface Waters Quality Bureau (SWQB) has determined to be or may reasonably be expected to be contributing to a violation of a water quality standard and/or that do not comply with the applicable anti-degradation provisions of the State's WQS are not authorized by this permit.

Note: Upon receipt of this determination, NMED anticipates that, within a reasonable period of time, EPA will notify the general permittee to apply for and obtain an individual NPDES permit for these discharges per 40 CFR Part 122.28(b)(3).

c. Inspections required under Subpart 3.10 must be conducted at least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater. The option for inspections at least once per 7 calendar days is not available. The Inspection Waivers provided in Parts 3.10.B and C still apply.

d. Permittees can not use temporary erosion controls as described in item 3 of the Appendix A definition of "Final Stabilization"as a method for final stabilization under the permit.

e. Signed copies of discharge monitoring reports, individual permit applications, and all other reports required by the permit to be submitted, shall also be sent to:

Program Manager
Point Source Regulation Section
Surface Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

2. NMR15000I: Indian country within the State of New Mexico, except Navajo Reservation Lands that are covered under Arizona permit AZR10000I and Ute Mountain Reservation Lands that are covered under Colorado permit COR10000I

a. *Pueblo of Acoma* The following conditions apply only to discharges on the Pueblo of Acoma.

i. A copy of the storm water pollution prevention plan, Notice of Intent, and Notice of Termination must be submitted to the Haaku Water Office at the address below. The pollution prevention plan must be submitted to the Pueblo at least thirty (30) days in advance of submitting the Notice of Intent to EPA.

HAAKU WATER OFFICE
Pueblo of Acoma
P.O. Box 309
Pueblo of Acoma, NM 87034

b. *Pueblo of Isleta* The following conditions apply only to discharges on the Pueblo of Isleta.

i. Subpart 1.3.C.4, (Eligibility, Limitations on Coverage) first sentence, is revised to read: "This permit does not authorize discharges that EPA or the Pueblo of Isleta, prior to authorization under this permit, determines will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard or impairment of a designated use of receiving waters."

ii. Subpart 2.4. (Where to Submit) is amended to add the following section (2.4.C):

C. Copies of all Notices of Intent submitted to EPA must also be sent concurrently to the Pueblo of Isleta at the following address. Discharges are not authorized by this permit unless an accurate and complete Notice of Intent has been submitted to the Pueblo of Islet

Regular U.S. Mail Delivery	OR	Overnight/Express Mail Delivery
Environment Department Pueblo of Isleta P.O. Box 1270 Isleta, NM 87022		Environment Department Building L 11000 Broadway, SE Albuquerque, NM 87105

iii. Part 2 (Authorizations for Discharges of Storm Water from Construction Activity), second sentence, is amended to read: " Discharges are not authorized if your NOI is incomplete or inaccurate, if you failed to submit a copy of the NOI to the Pueblo of Isleta, or if you were never eligible for permit coverage.

iv. Subpart 3.4. (Pollution Prevention Plan Contents: Controls to Reduce Pollutants), section A, last sentence, is amended to read: "For each major activity identified in the project description the SWPPP must clearly describe appropriate control measures, the general sequence during the construction process in which the measures will be implemented, and which operator is responsible for the control measure's implementation and maintenance."

v. Subpart 3.8 (Copy of Permit Requirements), first sentence, is revised to read "Copies of this permit and of the signed and certified NOI form that was submitted to the Pueblo of Isleta and EPA must be included in the SWPPP."

vi. Subpart 3.10.(Inspections), section A is revised to read "Inspections must be conducted at least once every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater."

vii. Subpart 3.10. (Inspections), section G, last paragraph, is amended to add: "Copies of inspection reports that identify incidents of noncompliance shall be sent to Pueblo of Isleta at the address listed in Subpart 2.4.C." (See above)

viii. Subpart 3.12. (Signature, Plan Review and Making Plans Available), section A, first sentence is amended to read: "A copy of the SWPPP (including a copy of the permit) must be retained at the construction site (or other location easily accessible during normal business hours to the Pueblo of Isleta's Environmental Department, EPA, a state, tribal or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service) from the date of commencement of construction activities to the date of final stabilization."

ix. Subpart 3.12. (Signature, Plan Review and Making Plans Available), section C. is amended to read: "SWPPPs must be made available upon request by EPA; representatives of the Pueblo of Isleta Environment Department, a state, tribal or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to the requestor. The copy of the

SWPPP that is required to be kept on-site or locally available must be made available, in its entirety, to the EPA staff and the Pueblo of Isleta's Environment Department staff for review and copying at the time of an on-site inspection.

x. Subpart 3.13. (Management Practices), section A is amended to add: "Erosion and sediment controls shall be designed to retain sediment on-site."

xi. Subpart 4.3 (Releases in Excess of Reportable Quantities), first bullet is amended to read: "you must provide notice to the Pueblo of Isleta Environment Department (505-869-5748) and the National Response Center (NRC) (800–424–8802; in the Washington, DC, metropolitan area call 202–426–2675) in accordance with the requirements of 40 CFR Part 110, 40 CFR Part 117 and 40 CFR Part 302 as soon as site staff have knowledge of the discharge; and"

xii. Subpart 4.5 (Attainment of Water Quality Standards After Authorization), is amended to add the following fourth bullet:

"You must provide the Pueblo of Isleta, at the address listed in Subpart 2.4.C, with a copy of the EPA notification, the supplemental action plan, data and certification required by EPA."

xiii. Subpart 5.3. (Where to Submit) is amended to add the following section (5.3.C):

C. Copies of all Notices of Termination submitted to EPA must also be sent concurrently to the Pueblo of Isleta at the following address.

Regular U.S. Mail Delivery	OR	Overnight/Express Mail Delivery
Environment Department Pueblo of Isleta P.O. Box 1270 Isleta, NM 87022		Environment Department Building L 11000 Broadway, SE Albuquerque, NM 87105

xiv. Any correspondence, other than NOIs and NOTs, with the Pueblo of Isleta concerning storm water discharges authorized by this permit shall sent one of the addresses in Subpart 5.3.C (see above).

xv. Appendix G, Section 9, first sentence is amended to read:

"You must allow the Pueblo of Isleta's Environment Department, EPA, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:"

xvi. Appendix G, Section 12, subsections A, B, C, F, G and H are amended to require that when you must notify EPA of an event (e.g., planned changes, anticipated noncompliance, transfers, required reporting due to potential adverse effects or environmental impacts or other noncompliance matters), the Pueblo of Isleta must also be notified.

xvii. Parties wishing to apply for an Equivalent Analysis Waiver (see Appendix D, Section C) must provide a copy of the waiver analysis to the Pueblo of Isleta at the address specified in Subpart 5.3.C (See above) at the time it is submitted to EPA.

c. *Pueblo of San Juan.* The following conditions apply only to discharges on the Pueblo of San Juan.

i. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be provided to the Pueblo at the time it is provided to the Environmental Protection Agency, at the following address:

Office of Environmental Affairs
Pueblo of San Juan
P.O. Box 717
San Juan, NM 87566

ii. Appendix G, Section 10 (Monitoring and records), item D is amended to add:

"All monitoring must be conducted in accordance with the Pueblo of San Juan's Quality Assurance Project Plan."

d. *Pueblo of Sandia.* The following conditions apply only to discharges on the Pueblo of Sandia.

i. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be provided to the Pueblo at the same time it is submitted to the Environmental Protection Agency.

Environment Department
Pueblo of Sandia
Box 6008
Bernalillo, NM 87004

ii. The Storm Water Pollution Prevention Plan must be available to tribal environmental personnel upon request.

iii. You must telephone the Pueblo of Sandia Environment Department at (505) 867-4533 of any noncompliance that may endanger human health or the environment within ten (10) hours of becoming aware of the circumstance.

e. *Santa Clara Pueblo.* The following conditions apply only to discharges on the Santa Clara Pueblo.

i. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be provided to the Santa Clara Pueblo Office of Environmental Affairs at the same time it is submitted to the Environmental Protection Agency.

Santa Clara Pueblo
Office of Environmental Affairs
One Knee Street
P.O. Box 580
Espanola, NM 87532

f. *Pueblo of Tesuque* The following conditions apply only to discharges on the Pueblo of Tesuque.

i. A copy of the storm water pollution prevention plan, Notice of Intent, and Notice of Termination must be submitted to the Pueblo of Tesuque Environment Department at the address below. The Notice of Intent and the Notice of Termination must be submitted at the same time they are submitted to EPA. The pollution prevention plan must be submitted before the project begins. Phone: 505- 983-2667 FAX: 505-982-2331

Pueblo of Tesuque
Environment Department
Rt. 42, Box 360-T
Santa Fe, NM 87506

3. OKR15000F: Discharges in the State of Oklahoma that are not under the authority of the Oklahoma Department of Environmental Quality, including activities associated with oil and gas exploration, drilling, operations, and pipelines (includes SIC Groups 13 and 46, and SIC codes 492 and 5171), and point source discharges associated with agricultural production, services, and silviculture (includes SIC Groups 01, 02, 07, 08, 09).

a. Subpart 1.3.C. (Limitations on Coverage) is modified to add paragraphs 8 and 9 as follows:

"8. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Big Lee Creek or an water or watershed designated "ORW" (Outstanding Resource Water) in Oklahoma's Water Quality Standards, this permit may only be used to authorize discharges from temporary construction activities. Discharges from ongoing activities such as sand and gravel mining or any other mineral mining are not authorized.

9. Activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Big Lee Creek or an water or watershed designated "ORW" (Outstanding Resource Water) in Oklahoma's Water Quality Standards, this permit may not be used to authorize discharges from concrete or asphalt batch plants."

D. Region 8

1. MTR10000I: Indian country within the State of Montana

a. Confederated Salish and Kootenai Tribes of the Flathead Nation. The following conditions apply only for projects on the Flathead Indian Reservation:

i. The permittee must send the SWPPP to the Tribes at least 30 days before construction starts. The 30 day period will give Tribal staff time to become familiar with the project site, prepare for construction inspections and determine compliance with Tribal water quality standards, as required by the Tribe's Water Quality Management Ordinance 89B (1990) and Surface Water Quality Standards & Antidegradation Policy (1995). Copies of the SWPPP should be sent to the following address:

Confederated Salish and Kootenai Tribes
Natural Resources Department
Department Head
P.O. Box 278
Pablo, MT 59855

ii. Before submitting the Notice of Termination, permittees must clearly demonstrate to an appointed tribal staff person during an on-site inspection that requirements for site stabilization have been met and all temporary erosion control structures removed. The staff person performing the on-site inspection will be determined by the Environmental Protection Division Manager. The staff person will draft a short letter stating the stabilization requirements have been met to add to the permittees Notice of Termination submission to EPA.

iii. The permittee must send a copy of the Notice of Intent (NOI) and the Notice of Termination (NOT) to the Tribes at the same time that the NOI and NOT is sent to EPA. Copies of the NOI and NOT should be sent to the address above.

b. Fort Peck Tribes - Assiniboine & Sioux. The following conditions apply only for projects within the Fort Peck Indian Reservation:

i. The permittee must send a copy of the Notice of Intent (NOI) and the Notice of Termination (NOT) to the Tribes at the same time that the NOI and NOT is sent to EPA. Copies of the NOI and NOT should be sent to the following address:

Deb Madison
Environmental Program Manager
Fort Peck Assiniboine & Sioux Tribes
P.O. Box 1027
Poplar, MT 59255

E. Region 9

1. ASR100000: The Island of American Samoa

a. Discharges authorized by the general permit shall meet all applicable American Samoa water quality standards.

b. Permittees discharging under the general permit shall comply with all conditions of the permit.

2. AZR10000I: Indian country lands within the State of Arizona, including Navajo Reservation lands in New Mexico and Utah

a. White Mountain Apache Tribe. The following condition applies only for projects on the White Mountain Apache Reservation: All NOIs for proposed storm water discharge coverage shall be provided to the following address:

Tribal Environmental Planning Office
P.O. Box 2109
Whiteriver, AZ 85941

3. NIR100000: Commonwealth of the Northern Mariana Islands (CNMI)

a. An Earthmoving and Erosion Control Permit shall be obtained from the CNMI DEQ prior to any construction activity covered under the NPDES general permit.

b. All conditions and requirements set forth in the USEPA NPDES general permit for discharges from large and small construction must be complied with.

c. A SWPPP for storm water discharges from construction activity must be approved by the Director of the CNMI DEQ prior to the submission of the NOI to USEPA. The CNMI address for the submittal of the SWPPP for approval is:

Commonwealth of the Northern Mariana Islands
Office of the Governor
Director, Division of Environmental Quality (DEQ)
P.O. Box 501304 C.K.
Saipan, MP 96950-1304

d. An NOI to be covered by the general permit for discharges from large and small construction sites must be submitted to CNMI DEQ (use above address) and USEPA, Region 9, in the form prescribed by USEPA, accompanied by a SWPPP approval letter from CNMI DEQ.

e. The NOI must be postmarked seven (7) calendar days prior to any storm water discharges and a copy must be submitted to the Director of CNMI DEQ (use above address) no later than seven (7) calendar days prior to any stormwater discharges.

f. Copies of all monitoring reports required by the NPDES general permit must be submitted to CNMI DEQ (use above address).

g. In accordance with section 10.3(h) and (i) of the CNMI water quality standards, CNMI DEQ reserves the right to deny coverage under the general permit and to require submittal of an application for an individual NPDES permit based on a review of the NOI or other information made available to the Director.

F. Region 10

1. AKR100000: The State of Alaska, except Indian country

a. Operators of construction projects disturbing five or more acres occurring outside the Municipality of Anchorage must submit a copy of the Storm Water Pollution Prevention Plan (SWPPP) and a copy of the Notice of Intent (NOI) to the State of Alaska Department of Environmental Conservation (ADEC) for review, and shall be accompanied by the state-required fee of $400. Submittal of the SWPPP and the NOI to the ADEC should be made at the same time the NOI is submitted to the EPA.

b. Operators of publicly-funded projects disturbing five or more acres occurring within the Municipality of Anchorage must submit a copy of the SWPPP and a copy of the NOI to the ADEC for review, and shall be accompanied by the state-required fee of $400. Submittal of the SWPPP and the NOI to the ADEC should be made at the same time the NOI is submitted to the EPA.

c. Operators of construction projects disturbing at least one acre and less than five acres must submit a copy of the NOI to the ADEC at the same time it is submitted to the EPA.

d. Storm Water Pollution Prevention Plans and Notices of Intent must be submitted to ADEC at the following address:

Alaska Department of Environmental Conservation
Water Quality Permitting/Storm Water
555 Cordova Street
Anchorage, Alaska 99501

e. Operators of private construction projects disturbing one or more acres within the Municipality of Anchorage shall submit a copy of the Storm Water Pollution Prevention Plan to the Municipality at the following address:

Municipality of Anchorage, Office of Planning Development and Public Works
4700 S. Bragaw Street
P.O. Box 196650
Anchorage, Alaska 99519-6650

f. Submittal of the SWPPP to the Municipality of Anchorage should be made before or at the same time the NOI is submitted to the EPA and the ADEC and shall be accompanied by any Municipality-required fee.

2. IDR100000: The State of Idaho, except Indian country

   a. Any construction related storm water discharges to impaired water bodies on Idaho's Clean Water Act (CWA) Section 303(d) list with EPA-approved Total Maximum Daily Loads (TMDL) must be consistent with any load allocations established by the applicable TMDL.

   b. No net increase of listed pollutants is allowed in any construction related storm water discharges to an impaired water body considered "high priority" as included on Idaho's CWA Section 303(d) list that does not yet have an EPA-approved TMDL.

   c. If a TMDL has not been established for an impaired water body considered "medium priority" or "low priority" as included on Idaho's CWA Section 303(d) list, BMPs shall be employed as necessary to prohibit further impairment of the designated or existing beneficial uses.

   d. Only BMPs authorized by the appropriate designated agency as defined in the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02 et seq.), or otherwise approved by the Idaho Department of Environmental Quality, will be allowed.

   e. Use of the "Equivalent Analysis Waiver" in Addendum D is not authorized.

   f. Operators may contact the Idaho Department of Environmental Quality regional office nearest the construction activity for more information about impaired waterways:

Boise Regional Office:
1445 N. Orchard
Boise ID 83706-2239
Tel: (208)373-0550
Fax: (208)373-0287

Grangeville Satellite Office:
300 W. Main
Grangeville ID 83530
Tel: (208)983-0808
Fax: (208)983-2873

Pocatello Regional Office:
444 Hospital Way #300
Pocatello ID 83201
Tel: (208)236-6160
Fax: (208)236-6168

Cascade Satellite Office:
109 N. Main St., PO Box 247
Cascade, ID 83611
Tel: (208)382-6808
Fax: (208)382-3327

Idaho Falls Regional Office:
900 N. Skyline, Suite B
Idaho Falls, ID 83402
Tel: (208)528-2650
Fax: (208)528-2695

Twin Falls Regional Office:
601 Pole Line Road, Suite 2
Twin Falls, ID 83301
Tel: (208)736-2190
Fax: (208)736-2194

Coeur d'Alene Regional Office:
2110 Ironwood Parkway
Coeur d'Alene ID 83814
Tel: (208)769-1422
Fax: (208)769-1404

Lewiston Regional Office:
1118 "F" Street
Lewiston, ID 83501
Tel: (208)799-4370
Toll Free: 1-877-541-3304
Fax: (208)799-3451

3. ORR10000I: Indian country within the State of Oregon, except Fort McDermitt Reservation lands (see Region 9):

   a. Confederated Tribes of the Umatilla Indian Reservation. The following conditions apply only for projects within the exterior boundaries of the Umatilla Indian Reservation:

      i. The operator shall be responsible for achieving compliance with the Confederated Tribes of the Umatilla Indian Reservation's (CTUIR) Water Quality Standards.

      ii. The operator shall submit all Erosion Control and/or Storm Water Pollution Prevention Plans to the CTUIR Water Resources Program for review and approval by the Department of Natural Resources Director prior to submitting the Notice of Intent to EPA and prior to beginning any discharge activities.

      iii. The operator shall contact the CTUIR Tribal Historic Preservation Office (THPO) prior to beginning any construction activities to determine whether a cultural resource survey of the project area or other investigation is required. All cultural resource fieldwork must be conducted by qualified personnel and documented using Oregon Reporting Standards. The resulting report must be submitted to the THPO for concurrence at least 30 days before any ground disturbing work can occur at the site. The operator must obtain THPO concurrence in the form of a letter, which (if necessary) will include any measures that must be taken to prevent or mitigate adverse effects to potentially eligible historic properties, prior to any ground disturbing work.

      iv. The operator shall submit copies of the Notice of Intent to the CTUIR Water Resources Program and the CTUIR Tribal Historic Preservation Office at the same time it is submitted to EPA.

v. Erosion Control and Storm Water Pollution Prevention Plans and Notices of Intent shall be submitted to:

Confederated Tribes of the Umatilla Indian Reservation
Water Resources Program
P.O. Box 638
Pendleton, OR 97801
(541) 276-3447

Confederated Tribes of the Umatilla Indian Reservation
Cultural Resources Protection Program
Tribal Historic Preservation Office
P.O. Box 638
Pendleton, OR 97801
(541) 276-3629

b. Confederated Tribes of Warm Springs. The following conditions apply only for projects on the Warm Springs Indian Reservation:

i. All activities covered by this NPDES general permit occurring within a designated riparian buffer zone as established in Ordinance 74 (Integrated Resource Management Plan or IRMP) must be reviewed, approved and permitted through the Tribe's Hydraulic Permit Application process, including payment of any applicable fees.

ii. All activities covered by this NPDES general permit must follow all applicable land management and resource conservation requirements specified in the IRMP.

iii. Operators of activities covered by this NPDES general permit must submit a Storm Water Pollution Prevention Plan to the Tribe's Water Control Board at the following address for approval at least 30 days prior to beginning construction activity:

Chair, Warm Springs Water Control Board
P.O. Box C
Warm Springs, Oregon 97761

4. WAR10000F: Federal Facilities in the State of Washington, except those located on Indian Country

The following conditions apply to stormwater discharges from all permitted construction sites which disturb one acre or more and which discharge to surface waters (40 CFR part 122.26(b)(14)(x) and 122.26 (b)(15)):

a. Discharges must not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), sediment management standards (Chapter 173-204 WAC), ground water quality standards (Chapter 173-200 WAC), and human health-based criteria in the National Toxics Rule (Federal Register, Vol. 57, No. 246, Dec. 22, 1992, pages 60848-60923). Discharges that are not in compliance with these standards are not authorized.

b. You must apply all known available and reasonable methods of prevention, control and treatment (AKART), including the preparation and implementation of an adequate Stormwater Pollution Prevention Plan (SWPPP), with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

c. Stormwater BMPs must be properly designed, constructed, maintained and operated to:

i. Prevent pollution of state waters and protect water quality, including compliance with applicable state water quality standards;

ii. Satisfy state requirements for all known available and reasonable methods of prevention, control and treatment (AKART) of wastes (including construction stormwater runoff) prior to discharge to waters of the state; and

iii. Satisfy the federal technology-based treatment requirements under 40 CFR part 125.3.

d. You must document the technical basis for the design criteria used to select and design your stormwater management BMPs. You must document within your Stormwater Pollution Prevention Plan (SWPPP) how stormwater BMPs were selected, the pollutant removal performance expected from the BMP being selected, the technical basis (scientific, technical studies, and/or modeling) which support the performance claims for the BMPs being selected, and an assessment of how the selected BMP will

comply with state water quality standards, satisfy the state AKART requirements, and satisfy the federal technology-based treatment requirements.

If you choose to follow the stormwater management practices contained in stormwater technical manuals approved by Washington State, including the proper selection, implementation and maintenance of appropriate BMPs, you are presumed to have satisfied this demonstration requirement and do not need to include within the SWPPP the technical basis which support the performance claims for the BMPs being used. The SWPPP must include a reference to the manual used. Approved stormwater technical manuals include:

i. Stormwater Management Manual for Western Washington, August 2001, for sites west of the crest of the Cascade Mountains;

ii. Stormwater Management Manual for Eastern Washington, (completion expected in the fall of 2003) for sites east of the crest of the Cascade Mountains; or

iii. Other equivalent stormwater management guidance documents approved by Ecology.

e. Stormwater discharges from construction sites which disturb 5 acres or more (40 CFR part 122.26(b)(14)(x)) and which discharge to surface waters listed as impaired by the state under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, and/or phosphorus are subject to an effluent limitation that is equal to the applicable water quality standards at the point of discharge. If impairment is due to turbidity and/or fine sediment, the turbidity at the point of discharge shall not exceed the background (upstream) turbidity of the receiving water.

i. Effluent limitations apply to direct discharges to listed waterbodies as well as indirect discharges via a stormwater conveyance system.

ii. All references and requirements associated with Section 303(d) of the Clean Water Act shall use the most current listing by Ecology of impaired waters that exists at the time of application for coverage under this permit

f. Stormwater discharges from construction sites which disturb 5 acres or more (40 CFR part 122.26(b)(14)(x)) and which discharge to surface waters for which there is a total maximum daily load (TMDL) allocation or other control plan that addresses sediment (including turbidity, fine sediment, total suspended solids or siltation), high pH, or phosphorus must be consistent with the requirements in the approved TMDL or applicable control plan. Control plans may be total maximum daily load (TMDL) determinations, restrictions for the protection of endangered species, ground water management plans, or other limitations that regulate or set limits on discharges to a specific waterbody or groundwater recharge area.

Information on impaired waterways is available from the Department of Ecology web site at: http://www.ecy.wa.gov/programs/wq/stormwater. You may also contact the Department of Ecology for more information about impaired waterways at:

Mailing Address:
Department of Ecology
Stormwater Unit
PO Box 47600
Olympia, WA 98504-7600
Phone: 360-407-6000

Physical Address:
Department of Ecology
300 Desmond Drive
Lacey, WA 98503
Phone: 360-407-6000

5. WAR10000I: Indian country within the State of Washington

a. Puyallup Tribe of Indians. The following conditions apply only for projects on the Puyallup Reservation:

i. Each operator shall be responsible for achieving compliance with the Puyallup Tribe's Water Quality Standards.

ii. Each operator shall submit all Pollution Prevention Plans to the Puyallup Tribe Environmental Department for review and approval prior to beginning any discharge activities.

iii. Each operator shall submit a copy of the Notice of Intent to the Puyallup Tribal Environmental Department at the same time it is submitted to EPA.

iv. Storm Water Pollution Prevention Plans and Notices of Intent shall be submitted to:

Puyallup Tribe Natural Resources, Environmental Department
1850 Alexander Avenue
Tacoma, WA 98421

b. Confederated Tribes of the Chehalis Reservation. The following conditions apply only for projects on the Chehalis Reservation:

i. The operator shall be responsible for achieving compliance with the Chehalis Tribe's Water Quality Standards.

ii. The operator shall submit a Storm Water Pollution Prevention Plan to the Chehalis Tribe Department of Natural Resources for review and approval at least thirty (30) days prior to beginning any discharge activities.

iii. The operator shall submit a copy of the Notice of Intent to the Chehalis Tribe Department of Natural Resources at the same time it is submitted to EPA.

iv. Storm Water Pollution Prevention Plans and Notices of Intent shall be submitted to:

Chehalis Tribe Department of Natural Resources
420 Howanut Road
Oakville, WA 98568

Appendix A - Definitions and Acronyms

Definitions

"Arid Areas" means areas with an average annual rainfall of 0 to 10 inches.

"Best Management Practices" (BMPs) means schedules 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 plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Commencement of Construction Activities" means the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction-related activities (e.g., stockpiling of fill material).

"Control Measure" as used in this permit, refers to any BMP or other method used to prevent or reduce the discharge of pollutants to waters of the United States.

"CWA" means the Clean Water Act or the Federal Water Pollution Control Act, 33 U.S.C. section 1251 et seq.

"Discharge" when used without qualification means the "discharge of a pollutant."

"Discharge of Storm Water Associated with Construction Activity" as used in this permit, refers to a discharge of pollutants in storm water from areas where soil disturbing activities (e.g., clearing, grading, or excavation), construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck washout, fueling), or other industrial storm water directly related to the construction process (e.g., concrete or asphalt batch plants) are located.

"Eligible" means qualified for authorization to discharge storm water under this general permit.

"Facility" or "Activity" means any "point source" or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

"Federal Facility" means any buildings, installations, structures, land, public works, equipment, aircraft, vessels, and other vehicles and property, owned by, or constructed or manufactured for the purpose of leasing to, the Federal government.

"Final Stabilization" means that:

1. All soil disturbing activities at the site have been completed and either of the two following criteria are met:
   a. a uniform (e.g,, evenly distributed, without large bare areas) perennial vegetative cover with a density of 70 percent of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or
   b. equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
2. When background native vegetation will cover less than 100 percent of the ground (e.g., arid areas, beaches), the 70 percent coverage criteria is adjusted as follows: if the native vegetation covers 50 percent of the ground, 70 percent of 50 percent (0.70 X 0.50 = 0.35) would require 35 percent total cover for final stabilization. On a beach with no natural vegetation, no stabilization is required.
3. In arid and semi-arid areas only, all soil disturbing activities at the site have been completed and both of the following criteria have been met:
   a. Temporary erosion control measures (e.g., degradable rolled erosion control product) are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years without active maintenance by you,
   b. The temporary erosion control measures are selected, designed, and installed to achieve 70 percent vegetative coverage within three years.
4. For individual lots in residential construction, final stabilization means that either:
   a. The homebuilder has completed final stabilization as specified above, or

b. The homebuilder has established temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for, and benefits of, final stabilization.

5. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land, staging areas for highway construction, etc.), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to "water of the United States," and areas which are not being returned to their preconstruction agricultural use must meet the final stabilization criteria (1) or (2) or (3) above.

"Indian country" is defined at 40 CFR §122.2 to mean:

1. All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
2. All dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have not been extinquished, including rights-of-ways running through the same.

"Large Construction Activity" is defined at 40 CFR §122.26(b)(14)(x) and incorporated here by reference. A large construction activity includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than five acres of land or will disturb less than five acres of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than five acres. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

"Municipal Separate Storm Sewer System" or "MS4" is defined at 40 CFR §122.26(b)(8) to mean a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

1. Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
2. Designed or used for collecting or conveying storm water;
3. Which is not a combined sewer; and
4. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

"New Project" means the "commencement of construction activities" occurs after the effective date of this permit.

"Ongoing Project" means the "commencement of construction activities" occurs before the effective date of this permit.

"Operator" for the purpose of this permit and in the context of storm water associated with construction activity, means any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
2. The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions). This definition is provided to inform permittees of EPA's interpretation of how the regulatory definitions of "owner or operator" and "facility or activity" are applied to discharges of storm water associated with construction activity.

"Owner or operator" means the owner or operator of any "facility or activity" subject to regulation under the NPDES program.

"Permitting Authority" means the United States Environmental Protection Agency, EPA, a Regional Administrator of the Environmental Protection Agency or an authorized representative.

"Point Source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

"Pollutant" is defined at 40 CFR §122.2. A partial listing from this definition includes: dredged spoil, solid waste, sewage, garbage, sewage sludge, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial or municipal waste.

"Project Area" means:

- The areas on the construction site where storm water discharges originate and flow toward the point of discharge into the receiving waters (including areas where excavation, site development, or other ground disturbance activities occur) and the immediate vicinity. (Example: 1. Where bald eagles nest in a tree that is on or bordering a construction site and could be disturbed by the construction activity or where grading causes storm water to flow into a small wetland or other habitat that is on the site that contains listed species.)
- The areas where storm water discharges flow from the construction site to the point of discharge into receiving waters. (Example: Where storm water flows into a ditch, swale, or gully that leads to receiving waters and where listed species (such as amphibians) are found in the ditch, swale, or gully.)
- The areas where storm water from construction activities discharge into receiving waters and the areas in the immediate vicinity of the point of discharge. (Example: Where storm water from construction activities discharges into a stream segment that is known to harbor listed aquatic species.)
- The areas where storm water BMPs will be constructed and operated, including any areas where storm water flows to and from BMPs. (Example: Where a storm water retention pond would be built.)
- The areas upstream and /or downstream from construction activities discharges into a stream segment that may be affected by the said discharges. (Example: Where sediment discharged to a receiving stream settles downstream and impacts a breeding area of a listed aquatic species.)

"Receiving water" means the "Water of the United States" as defined in 40 CFR §122.2 into which the regulated storm water discharges.

"Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

"Semi-Arid Areas" means areas with an average annual rainfall of 10 to 20 inches.

"Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

"Small Construction Activity" is defined at 40 CFR §122.26(b)(15) and incorporated here by reference. A small construction activity includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than one (1) acre and less than five (5) acres of land or will disturb less than one (1) acre of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than one (1) acre and less than five (5) acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

"Storm Water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

"Storm Water Discharge-Related Activities" as used in this permit, include: activities that cause, contribute to, or result in storm water point source pollutant discharges, including but not limited to: excavation, site development, grading and other surface disturbance activities; and measures to control storm water including the siting, construction and operation of BMPs to control, reduce or prevent storm water pollution.

"Total Maximum Daily Load" or "TMDL" means the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

"Waters of the United States" is as defined at 40 CFR §122.2.

"Wetland" means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

ACRONYMS

BMP - Best Management Practices

CGP - Construction General Permit

CFR - Code of Federal Regulations

CWA - Clean Water Act

EPA - United States Environmental Protection Agency

ESA - Endangered Species Act

FWS - United States Fish and Wildlife Service

MS4 - Municipal Separate Storm Sewer System

MSGP - Multi-Sector General Permit

NHPA - National Historic Preservation Act

NMFS - United States National Marine Fisheries Service

NOI - Notice of Intent

NOT - Notice of Termination

NPDES - National Pollutant Discharge Elimination System

POTW - Publicly Owned Treatment Works

SHPO - State Historic Preservation Officer

SWPPP - Storm Water Pollution Prevention Plan

THPO - Tribal Historic Preservation Officer

TMDL - Total Maximum Daily Load

WQS - Water Quality Standard

Appendix B - Permit Areas Eligible for Coverage

Permit coverage for storm water discharges from construction activity occurring within the following areas is provided by legally separate and distinctly numbered permits:

1. EPA Region 1: CT, MA, ME, NH, RI, VT

US EPA, Region 01
Office of Ecosystem Protection
NPDES Storm Water Program
1 Congress St, Suite 1100 (CMU)
Boston, MA 02114-2023

The States of Connecticut, Maine, Rhode Island, and Vermont are the NPDES Permitting Authority for the majority of discharges within their respective states.

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
MAR100000	Commonwealth of Massachusetts (except Indian country)
MAR10000I	Indian country within the State of Massachusetts
CTR10000I	Indian country within the State of Connecticut
NHR100000	State of New Hampshire
RIR10000I	Indian country within the State of Rhode Island
VTR10000F	Federal Facilities in the State of Vermont
MER10000I	Indian country within the State of Maine

2. EPA Region 2: NJ, NY, PR, VI

For NJ, NY, and VI:

US EPA, Region 02
NPDES Storm Water Program
290 Broadway, 24th Floor
New York, NY 10007-1866

For PR:

US EPA, Region 02
Caribbean Environmental Protection Division
NPDES Storm Water Program
1492 Ponce de Leon Ave
Central Europa Building, Suite 417
San Juan, PR 00907-4127

The State of New York is the NPDES Permitting Authority for the majority of discharges within its state. The State of New Jersey and the Virgin Islands are the NPDES Permitting Authority for all discharges within their respective states.

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
NYR10000I	Indian country within the State of New York
PRR100000	The Commonwealth of Puerto Rico

3. EPA Region 3: DE, DC, MD, PA, VA, WV

US EPA, Region 03
NPDES Storm Water Program
1650 Arch St
Philadelphia, PA 19103

The State of Delaware is the NPDES Permitting Authority for the majority of discharges within its state. Maryland, Pennsylvania, Virginia, and West Virginia are the NPDES Permitting Authority for all discharges within their respective states.

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
DCR100000	The District of Columbia
DER10000F	Federal Facilities in the State of Delaware

4. EPA Region 4: AL, FL, GA, KY, MS, NC, SC, TN

US EPA, Region 04
Water Management Division
NPDES Storm Water Program
61 Forsyth St SW
Atlanta, GA 30303-3104

Coverage Not Available. Construction activities in Region 4 must obtain permit coverage under an alternative permit.

5. EPA Region 5: IL, IN, MI, MN, OH, WI

US EPA, Region 05
NPDES & Technical Support
NPDES Storm Water Program
77 W Jackson Blvd
(WN-16J)
Chicago, IL 60604-3507

The States of Michigan, Minnesota, and Wisconsin are the NPDES Permitting Authority for the majority of discharges within their respective states. The States of Illinois, Indiana, and Ohio are the NPDES Permitting Authorities for all discharges within their respective states.

Permit No.	Areas of coverage/where EPA is Permitting Authority
MIR10000I	Indian country within the State of Michigan
MNR10000I	Indian country within the State of Minnesota
WIR10000I	Indian country within the State of Wisconsin, except the Sokaogon Chippewa (Mole Lake) Community.

6. EPA Region 6: AR, LA, OK, TX, NM (except see Region 9 for Navajo lands, and see Region 8 for Ute Mountain Reservation lands)

US EPA, Region 06
NPDES Storm Water Program
1445 Ross Ave, Suite 1200
Dallas, TX 75202-2733

The States of Louisiana, Oklahoma, and Texas are the NPDES Permitting Authority for the majority of discharges within their respective state. The State of Arkansas is the NPDES Permitting Authority for all discharges within its respective state.

Permit No.	Areas of coverage/where EPA is Permitting Authority
LAR15000I	Indian country within the State of Louisiana
NMR150000	The State of New Mexico, except Indian country
NMR15000I	Indian country within the State of New Mexico, except Navajo Reservation Lands that are covered under Arizona permit AZR10000I and Ute Mountain Reservation Lands that are covered under Colorado permit COR10000I.
OKR15000I	Indian country within the State of Oklahoma
OKR15000F	Discharges in the State of Oklahoma that are not under the authority of the Oklahoma Department of Environmental Quality, including activities associated with with oil and gas exploration, drilling, operations, and pipelines (includes SIC Groups 13 and 46, and SIC codes 492 and 5171), and point source discharges associated with agricultural production, services, and silviculture (includes SIC Groups 01, 02, 07, 08, 09).
TXR15000F	Discharges in the State of Texas that are not under the authority of the Texas Commission on Environmental Quality (formerly TNRCC), including activities associated with the exploration, development, or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline.
TXR15000I	Indian country within the State of Texas.

7. EPA Region 7: IA, KS, MO, NE (except see Region 8 for Pine Ridge Reservation Lands)

US EPA, Region 07
NPDES Storm Water Program
901 N 5th St
Kansas City, KS 66101

The States of Iowa, Kansas, and Nebraska are the NPDES Permitting Authority for the majority of discharges within their respective states. The State of Missouri is the NPDES Permitting Authority for all discharges within its state.

Permit No.	Areas of coverage/where EPA is Permitting Authority
IAR10000I	Indian country within the State of Iowa
KSR10000I	Indian country within the State of Kansas
NER10000I	Indian country within the State of Nebraska, except Pine Ridge Reservation lands (see Region 8)

8. EPA Region 8: CO, MT, ND, SD, WY, UT (except see Region 9 for Goshute Reservation and Navajo Reservation Lands), the Ute Mountain Reservation in NM, and the Pine Ridge Reservation in NE.

US EPA, Region 08
NPDES Storm Water Program
999 18th St, Suite 300
(EPR-EP)
Denver, CO 80202-2466

The States of Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming are the NPDES Permitting Authority for the majority of discharges within their respective states.

Permit No.	Areas of coverage/where EPA is Permitting Authority
COR10000F	Federal Facilities in the State of Colorado, except those located on Indian country
COR10000I	Indian country within the State of Colorado, as well as the portion of the Ute Mountain Reservation located in New Mexico
MTR10000I	Indian country within the State of Montana
NDR10000I	Indian country within the State of North Dakota, as well as that portion of the Standing Rock Reservation located in South Dakota (except for the portion of the lands within the former boundaries of the Lake Traverse Reservation which is covered under South Dakota permit SDR10000I listed below)
SDR10000I	Indian country within the State of South Dakota, as well as the portion of the Pine Ridge Reservation located in Nebraska and the portion of the lands within the former boundaries of the Lake Traverse Reservation located in North Dakota (except for the Standing Rock Reservation which is covered under North Dakota permit NDR10000I listed above)
UTR10000I	Indian country within the State of Utah, except Goshute and Navajo Reservation lands (see Region 9)
WYR10000I	Indian country within the State of Wyoming

9. EPA Region 9: CA, HI, NV, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Goshute Reservation in UT and NV, the Navajo Reservation in UT, NM, and AZ, the Duck Valley Reservation in ID, and the Fort McDermitt Reservation in OR.

US EPA, Region 09
NPDES Storm Water Program
75 Hawthorne St
San Francisco, CA 94105-3901

The States of Arizona, California and Nevada are the NPDES Permitting Authority for the majority of discharges within their respective states. The State of Hawaii is the NPDES Permitting Authority for all discharges within its state.

Permit No.	Areas of coverage/where EPA is Permitting Authority
ASR100000	The Island of American Samoa
AZR10000I	Indian country within the State of Arizona, as well as Navajo Reservation lands in New Mexico and Utah
CAR10000I	Indian country within the State of California
GUR100000	The Island of Guam
JAR100000	Johnston Atoll
MWR100000	Midway Island and Wake Island
NIR100000	Commonwealth of the Northern Mariana Islands
NVR10000I	Indian country within the State of Nevada, as well as the Duck Valley Reservation in Idaho, the Fort McDermitt Reservation in Oregon and the Goshute Reservation in Utah

10. EPA Region 10: AK, WA, ID (except see Region 9 for Duck Valley Reservation Lands), and OR (except see Region 9 for Fort McDermitt Reservation).

US EPA, Region 10
NPDES Storm Water Program
1200 6th Ave (OW-130)
Seattle, WA 98101-1128
Phone: (206) 553-6650

The States of Oregon and Washington are the NPDES Permitting Authority for the majority of discharges within their respective states.

Permit No.	Areas of coverage/where EPA is Permitting Authority
AKR100000	The State of Alaska, except Indian country
AKR10000I	Indian country within the state of Alaska
IDR100000	The State of Idaho, except Indian country
IDR10000I	Indian country within the State of Idaho, except Duck Valley Reservation lands (see Region 9)
ORR10000I	Indian country within the State of Oregon, except Fort McDermitt Reservation lands (see Region 9)
WAR10000F	Federal Facilities in the State of Washington, except those located on Indian country
WAR10000I	Indian country within the State of Washington

Appendix C - Endangered Species Act Review Procedures

You must meet at least one of the six criteria in Subpart 1.3.C.6 to be eligible for coverage under this permit. You must follow the procedures in this Appendix to assess the potential effects of storm water discharges and storm water discharge-related activities on listed species and their critical habitat. When evaluating these potential effects, operators must evaluate the entire project area.

For purposes of this Appendix, the term "project area" is inclusive of the term "Action Area." Action area is defined in 50 CFR §402.02 as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. This includes areas beyond the footprint of the construction area that may be affected by storm water discharges and storm water discharge related activities. "Project area" is defined in Appendix A.

(Operators who are eligible and able to certify eligibility under Criterion B, C, D, or F of Subpart 1.3.C.6 because of a previously issued ESA section 10 permit, a previously completed ESA section 7 consultation, or because the operator's activities were already addressed in another operator's certification of eligibility may proceed directly to Step Four.)

Step One: Determine if Listed Threatened or Endangered Species are Present On or Near Your Project Area

You must determine, to the best of your knowledge, whether listed species are located on or near your project area. To make this determination, you should:

- Determine if listed species are in your county or township. The local offices of the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and State or Tribal Heritage Centers often maintain lists of federally listed endangered or threatened species on their internet sites. Visit www.epa.gov/npdes/stormwater/cgp to find the appropriate site for your state or check with your local office. In most cases, these lists allow you to determine if there are listed species in your county or township.
- If there are listed species in your county or township, check to see if critical habitat has been designated and if that area overlaps or is near your project area.
- Contact your local FWS, NMFS, or State or Tribal Heritage Center to determine if the listed species could be found on or near your project area and if any critical habitat areas have been designated that overlap or are near your project area. Critical habitat areas maybe designated independently from the listed species for your county, so even if there are no listed species in your county or township, you must still contact one of the agencies mentioned above to determine if there are any critical habitat areas on or near your project area.

You can also find critical habitat designations and associated requirements at 50 CFR Parts 17 and 226. http://www.access.gpo.gov.

- If there are no listed species in your county or township, no critical habitat areas on or near your project area, or if your local FWS, NMFS, or State or Tribal Heritage Center indicates that listed species are not a concern in your part of the county or township, you may check box A on the Notice of Intent Form.
- If there are listed species and if your local FWS, NMFS, or State or Tribal Heritage Center indicates that these species could exist on or near your project area, you will need to do one or more of the following:
    - Conduct visual inspections: This method may be particularly suitable for construction sites that are smaller in size or located in non-natural settings such as highly urbanized areas or industrial parks where there is little or no natural habitat, or for construction activities that discharge directly into municipal storm water collection systems.
    - Conduct a formal biological survey. In some cases, particularly for larger construction sites with extensive storm water discharges, biological surveys may be an appropriate way to assess whether species are located on or near the project area and whether there are likely adverse effects to such species. Biological surveys are frequently performed by environmental consulting firms. A biological survey may in some cases be useful in conjunction with Steps Two, Three, or Four of these instructions.
    - Conduct an environmental assessment under the National Environmental Policy Act (NEPA). Such reviews may indicate if listed species are in proximity to the project area. Coverage under the CGP does not trigger such a review because the CGP does not regulate new sources (that is, dischargers subject to New Source Performance Standards under section 306 of the Clean Water Act), and is thus statutorily

exempted from NEPA. See CWA section 511(c). However, some construction activities might require review under NEPA for other reasons such as federal funding or other federal involvement in the project.

If listed threatened or endangered species or critical habitat are present in the project area, you must look at impacts to species and/or habitat when following Steps Two through Four. Note that many but not all measures imposed to protect listed species under these steps will also protect critical habitat. Thus, meeting the eligibility requirements of this CGP may require measures to protect critical habitat that are separate from those to protect listed species.

Step Two: Determine if the Construction Activity's Storm Water Discharges or Storm Water Discharge-Related Activities Are Likely to Adversely Affect Listed Threatened or Endangered Species or Designated Critical Habitat

To receive CGP coverage, you must assess whether your storm water discharges or storm water discharge-related activities is likely to adversely affect listed threatened or endangered species or designated critical habitat that are present on or near your project area.

Potential adverse effects from storm water discharges and storm water discharge-related activities include:

- *Hydrological.* Storm water discharges may cause siltation, sedimentation or induce other changes in receiving waters such as temperature, salinity or pH. These effects will vary with the amount of storm water discharged and the volume and condition of the receiving water. Where a storm water discharge constitutes a minute portion of the total volume of the receiving water, adverse hydrological effects are less likely. Construction activity itself may also alter drainage patterns on a site where construction occurs that can impact listed species or critical habitat.
- *Habitat.* Excavation, site development, grading, and other surface disturbance activities from construction activities, including the installation or placement of storm water BMPs, may adversely affect listed species or their habitat. Storm water may drain or inundate listed species habitat.
- *Toxicity.* In some cases, pollutants in storm water may have toxic effects on listed species.

The scope of effects to consider will vary with each site. If you are having difficulty determining whether your project is likely to adversely affect listed species or critical habitat, or one of the Services has already raised concerns to you, you must contact the appropriate office of the FWS, NMFS or Natural Heritage Center for assistance. If adverse effects are not likely, then you may check box E on the NOI form and apply for coverage under the CGP. If the discharge may adversely effect listed species or critical habitat, you must follow Step Three.

Step Three: Determine if Measures Can Be Implemented to Avoid Adverse Effects

If you make a preliminary determination that adverse effects are likely to occur, you can still receive coverage under Criterion E of Subpart 1.3.C.6 of the CGP if appropriate measures are undertaken to avoid or eliminate the likelihood of adverse effects prior to applying for CGP coverage. These measures may involve relatively simple changes to construction activities such as re-routing a storm water discharge to bypass an area where species are located, relocating BMPs, or by changing the "footprint" of the construction activity. You should contact the FWS and/or NMFS to see what appropriate measures might be suitable to avoid or eliminate the likelihood of adverse impacts to listed species and/or critical habitat. (See 50 CFR §402.13(b)). This can entail the initiation of informal consultation with the FWS and/or NMFS (described in more detail in Step Four).

If you adopt measures to avoid or eliminate adverse affects, you must continue to abide by those measures for the duration of the construction project and coverage under the CGP. These measures must be described in the SWPPP and are enforceable CGP conditions and/or conditions for meeting the eligibility criteria in Subpart 1.3. If appropriate measures to avoid the likelihood of adverse effects are not available, you must follow Step Four.

Step Four: Determine if the Eligibility Requirements of Criterion B, C, D, or F of Subpart 1.3.C.6 Can Be Met

Where adverse effects are likely, you must contact the FWS and/or NMFS. You may still be eligible for CGP coverage if any likely adverse effects can be addressed through meeting Criterion B, C, D, or F of Subpart 1.3.C.6 of the CGP. These criteria are as follows:

1. *An ESA Section 7 Consultation Is Performed for Your Activity (See Criterion B or C of Subpart 1.3.C.6 of the CGP).*

Formal or informal ESA section 7 consultation is performed with the FWS and/or NMFS that addresses the effects of your storm water discharges and storm water discharge-related activities on federally-listed and threatened

species and designated critical habitat. FWS and/or NMFS may request that consultation take place if any actions are identified that may affect listed species or critical habitat. In order to be eligible for coverage under this permit, consultation must result in a "no jeopardy opinion" or a written concurrence by the Service(s) on a finding that your storm water discharge(s) and storm water discharge-related activities are not likely to adversely affect listed species or critical habitat (For more information on consultation, see 50 CFR §402). If you receive a "jeopardy opinion," you may continue to work with the FWS and/or NMFS and your permitting authority to modify your project so that it will not jeopardize listed species or designated critical habitat.

Most consultations are accomplished through informal consultation. By the terms of this CGP, EPA has automatically designated operators as non-federal representatives for the purpose of conducting informal consultations. See Subpart 1.3.C.6 and 50 CFR §402.08 and §402.13. When conducting informal ESA section 7 consultation as a non-federal representative, you must follow the procedures found in 50 CFR Part 402 of the ESA regulations. You must notify FWS and/or NMFS of your intention and agreement to conduct consultation as a non-federal representative.

Consultation may occur in the context of another federal action at the construction site (e.g., where ESA section 7 consultation was performed for issuance of a wetlands dredge and fill permit for the project or where a NEPA review is performed for the project that incorporates a section 7 consultation). Any terms and conditions developed through consultations to protect listed species and critical habitat must be incorporated into the SWPPP. As noted above, operators may, if they wish, initiate consultation with the Services at Step Four.

Whether ESA section 7 consultation must be performed with either the FWS, NMFS or both Services depends on the listed species that may be affected by the operator's activity. In general, NMFS has jurisdiction over marine, estuaries, and anadromous species. Operators should also be aware that while formal section 7 consultation provides protection from incidental takings liability, informal consultation does not.

2. *An Incidental Taking Permit Under Section 10 of the ESA is Issued for the Operators Activity (See Criterion D of Subpart 1.3.C.6 of the CGP).*

Your construction activities are authorized through the issuance of a permit under section 10 of the ESA and that authorization addresses the effects of your storm water discharge(s) and storm water discharge-related activities on federally-listed species and designated critical habitat. You must follow FWS and/or NMFS procedures when applying for an ESA Section 10 permit (see 50 CFR §17.22(b)(1) for FWS and §222.22 for NMFS). Application instructions for section 10 permits for FWS and NMFS can be obtained by accessing the FWS and NMFS websites (http://www.fws.gov and http://www.nmfs.noaa.gov) or by contacting the appropriate FWS and NMFS regional office.

3. *You are Covered Under the Eligibility Certification of Another Operator for the Project Area (See Criterion F of Subpart 1.3.C.6 of the CGP).*

Your storm water discharges and storm water discharge-related activities were already addressed in another operator's certification of eligibility under Criteria A through E of Subpart 1.3.C.6 which also included your project area. For example, a general contractor or developer may have completed and filed an NOI for the entire project area with the necessary Endangered Species Act certifications (criteria A-E), subcontractors may then rely upon that certification and must comply with any conditions resulting from that process. By certifying eligibility under Criterion F of Subpart 1.3.C.6, you agree to comply with any measures or controls upon which the other operator's certification under Criterion B, C, or D of Subpart 1.3.C.6 was based. Certification under Criterion F of Subpart 1.3.C.6 is discussed in more detail in the Fact Sheet that accompanies this permit.

You must comply with any terms and conditions imposed under the eligibility requirements of Criterion A through F to ensure that your storm water discharges and storm water discharge-related activities are protective of listed species and/or critical habitat. Such terms and conditions must be incorporated in the project's SWPPP. If the eligibility requirements of Subpart 1.3.C.6 cannot be met, then you are not eligible for coverage under the CGP. In these instances, you may consider applying to EPA for an individual permit.

Appendix D - Small Construction Waivers and Instructions

These waivers are only available to storm water discharges associated with small construction activities (i.e., 1-5 acres). As the operator of a small construction activity, you may be able to qualify for a waiver in lieu of needing to obtain coverage under this general permit based on: (A) a low rainfall erosivity factor, (B) a TMDL analysis, or (C) an equivalent analysis that determines allocations for small construction sites are not needed. Each operator, otherwise needing permit coverage, must notify EPA of its intention for a waiver. It is the responsibility of those individuals wishing to obtain a waiver from coverage under this general permit to submit a complete and accurate waiver certification as described below. Where the operator changes or another is added during the construction project, the new operator must also submit a waiver certification to be waived.

A. Rainfall Erosivity Waiver

Under this scenario the small construction project's rainfall erosivity factor calculation ("R" in the Revised Universal Soil Loss Equation) is less than 5 during the period of construction activity. The operator must certify to the Permitting Authority that construction activity will occur only when the rainfall erosivity factor is less than 5. 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 stabilization practice that will provide interim non-vegetative stabilization can be used for the end of the construction period, provided the operator commits (as a condition of waiver eligibility) to periodically inspect and properly maintain the area until the criteria for final stabilization as defined in the construction 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 its certification statement constitutes acceptance of and commitment to complete the final stabilization process. The operator must submit a waiver certification to EPA prior to commencing construction activities.

Note: The rainfall erosivity factor "R" is determined in accordance with Chapter 2 of Agriculture Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE), pages 21–64, dated January 1997; United States Department of Agriculture (USDA), Agricultural Research Service.

EPA funded a cooperative agreement with Texas A&M University to develop an online rainfall erosivity calculator. You can access the calculator from EPA's website at: www.epa.gov/npdes/stormwater/cgp. Use of the calculator allows you 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. You may find that moving your construction activity by a few weeks or expediting site stabilization will allow you to qualify for the waiver.

If you are the operator of the construction activity and eligible for a waiver based on low erosivity potential, you must provide the following information on the waiver certification in order to be waived from permitting requirements:

1. Name, address and telephone number of the construction site operators;
2. Name (or other identifier), address, county or similar governmental subdivision, and latitude/longitude of the construction project or site;
3. Estimated construction start and completion (i.e., final stabilization) dates, and total acreage (to the nearest quarter acre) to be disturbed;
4. The rainfall erosivity factor calculation that applies to the active construction phase at your project site; and
5. A statement, signed and dated by an authorized representative as provided in Appendix G, Subsection 11, that certifies that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five.

At the time of publication, a Low Erosivity Waiver Form is not available. If EPA does create a form, it will be noticed (either directly, by public notice, or by making information available on the Internet at www.epa.gov/npdes/stormwater/cgp.

Note: If the R factor is 5 or greater, you cannot apply for the rainfall erosivity waiver, and must apply for permit coverage as per Subpart 2.1 of the construction general permit, unless you qualify for the Water Quality Waiver as described below.

If your small construction project continues beyond the projected completion date given on the waiver certification, you must recalculate the rainfall erosivity factor for the new project duration. If the R factor is below five (5), you

must update all applicable information on the waiver certification and retain a copy of the revised waiver as part of the site SWPPP. The new waiver certification must be submitted prior to the projected completion date listed on the original waiver form to assure your exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, you must submit an NOI as per Part 2.

B. TMDL Waiver

This waiver is available if EPA has established or approved a TMDL that addresses the pollutant(s) of concern and has determined that controls on storm water discharges from small construction activity are not needed to protect water quality. The pollutant(s) of concern include sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. Information on TMDLs that have been established or approved by EPA is available from EPA online at http://www.epa.gov/owow/tmdl/ and from state and tribal water quality agencies.

If you are the operator of the construction activity and eligible for a waiver based on compliance with an EPA established or approved TMDL, you must provide the following information on the Waiver Certification form in order to be waived from permitting requirements:

1. Name, address and telephone number of the construction site operator(s);
2. Name (or other identifier), address, county or similar governmental subdivision, and latitude/longitude of the construction project or site;
3. Estimated construction start and completion (i.e., final stabilization) dates, and total acreage (to the nearest quarter acre) to be disturbed;
4. The name of the water body(s) that would be receiving storm water discharges from your construction project;
5. The name and approval date of the TMDL;
6. A statement, signed and dated by an authorized representative as provided in Appendix G, Subsection 11, that certifies that the construction activity will take place and that the storm water discharges will occur, within the drainage area addressed by the TMDL.

C. Equivalent Analysis Waiver

This waiver is available for non-impaired waters only. The operator can develop an equivalent analysis that determines allocations for his small construction site for the pollutant(s) of concern or determines that such allocations are not needed to protect water quality. This waiver requires a small construction operator to develop an equivalent analysis based on existing in-stream concentrations, expected growth in pollutant concentrations from all sources, and a margin of safety.

If you are a construction operator who wants to use this waiver, you must develop your equivalent analysis and provide the following information to be waived from permitting requirements:

1. Name, address and telephone number of the construction site operator(s);
2. Name (or other identifier), address, county or similar governmental subdivision, and latitude/longitude of the construction project or site;
3. Estimated construction start and completion (i.e., final stabilization) dates, and total acreage (to the nearest quarter acre) to be disturbed;
4. The name of the water bodies that would be receiving storm water discharges from your construction project;
5. Your equivalent analysis;
6. A statement, signed and dated by an authorized representative as provided in Appendix G, Subsection 11, that certifies that the construction activity will take place and that the storm water discharges will occur, within the drainage area addressed by the equivalent analysis.

D. Waiver Deadlines and Submissions

1. Waiver certifications must be submitted prior to commencement of construction activities.

2. If you submit a TMDL or equivalent analysis waiver request, you are not waived until EPA approves your request. As such, you may not commence construction activities until receipt of approval from EPA.
3. Late Notifications: Operators are not prohibited from submitting waiver certifications after initiating clearing, grading, excavation activities, or other construction activities. The Agency reserves the right to take enforcement for any unpermitted discharges that occur between the time construction commenced and waiver authorization is granted.

Submittal of a waiver certification is an optional alternative to obtaining permit coverage for discharges of storm water associated with small construction activity, provided you qualify for the waiver. Any discharge of storm water associated with small construction activity not covered by either a permit or a waiver may be considered an unpermitted discharge under the Clean Water Act. As mentioned above, EPA reserves the right to take enforcement for any unpermitted discharges that occur between the time constructioncommenced and either discharge authorization is granted or a complete and accurate waiver certification is submitted. EPA may notify any operator covered by a waiver that they must apply for a permit. EPA may notify any operator who has been in non-compliance with a waiver that they may no longer use the waiver for future projects. Any member of the public may petition EPA to take action under this provision by submitting written notice along with supporting justification.

Complete and accurate Rainfall Erosivity waiver certifications must be sent to the following address:

Regular U.S. Mail Delivery

EPA Storm Water Notice Processing Center
Mail Code 4203M
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Overnight/Express Mail Delivery

EPA Storm Water Notice Processing Center
Room 7420
U.S. EPA
1201Constitution Avenue, NW
Washington, DC 20004

Complete and accurate TMDL or equivalent analysis waiver requests must be sent to the applicable EPA Region office specified in Appendix B.

Appendix E - Notice of Intent Form and Instructions

From the effective date of this permit, operators are to use the Notice of Intent Form contained in this Appendix to obtain permit coverage.

This Form Replaces Form 3510-9 (8-98)
Refer to the Following Pages for Instructions

Form Approved OMB Nos. 2040-0188 and 2040-0211

NPDES Form

United States Environmental Protection Agency
Washington, DC 20460

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

Submission of this Notice of Intent (NOI) constitutes notice that the party identified in Section II of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section I of this form. Submission of this NOI also constitutes notice that the party identified in Section II of this form meets the eligibility requirements of the CGP for the project identified in Section III of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Refer to the instructions at the end of this form.

I. Permit Number

II. Operator Information

Name:

IRS Employer Identification Number (EIN): -

Mailing Address:

Street:

City: State: Zip Code: -

Phone: - - Fax (optional): - -

E-mail (optional):

III. Project/Site Information

Project/Site Name:

Project Street/Location:

City: State: Zip Code: -

County or similar government subdivision:

Latitude/Longitude (Use one of three possible formats, and specify method)

Latitude
1. __°__′__″ N (degrees, minutes, seconds)
2. __°__.__′ N (degrees, minutes, decimal)
3. __.____° N (decimal)

Longitude
1. ___°__′__″ W (degrees, minutes, seconds)
2. ___°__.__′ W (degrees, minutes, decimal)
3. ___.____° W (decimal)

Method: ☐ U.S.G.S. topographic map ☐ EPA web site ☐ GPS ☐ Other:
• If you used a U.S.G.S. topographic map, what was the scale: _____

Project Located in Indian country? ☐ Yes ☐ No
If so, name of Reservation or if not part of a Reservation, put "Not Applicable": _____

Estimated Project Start Date: / / (Month Date Year)

Estimated Project Completion Date: / / (Month Date Year)

Estimated Area to be Disturbed (to the nearest quarter acre): .

IV. SWPPP Information

Has the SWPPP been prepared in advance of filing this NOI? ☐ Yes ☐ No

Location of SWPPP for viewing: ☐ Address in Section II ☐ Address in Section III ☐ Other

If Other:

SWPPP Street: _____

City: _____

State: ___ Zip Code: _____ - _____

SWPPP Contact Information (if different than that in Section II):

Name: _____

Phone: ___ - ___ - ____ Fax (optional): ___ - ___ - ____

E-mail (optional): _____

V. Discharge Information

Identify the name(s) of waterbodies to which you discharge. _____

_____

Is this discharge consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s)?

☐ Yes ☐ No

VI. Endangered Species Information

Under which criterion of the permit have you satisfied your ESA eligibility obligations?

☐ A ☐ B ☐ C ☐ D ☐ E ☐ F

- If you select criterion F, provide permit tracking number of operator under which you are certifying eligibility:

_____

VII. Certification Information

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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: _____

Print Title: _____

Signature: _____

Date: _____

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form | This Form Replaces Form 3510-9 (8/98) | Form Approved OMB Nos. 2040-0188 and 2040-0211

Who Must File an NOI Form
Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et.seq.; the Act), federal law prohibits storm water discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) Permit. Operator(s) of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must submit an NOI to obtain coverage under an NPDES general permit. Each person, firm, public organization, or any other entity that meets either of the following criteria must file this form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with SWPPP requirements or other permit conditions. If you have questions about whether you need an NPDES storm water permit, or if you need information to determine whether EPA or your state agency is the permitting authority, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755.

Where to File NOI Form
See the applicable CGP for information on where to send your completed NOI form.

Completing the Form
Obtain and read a copy of the appropriate EPA Storm Water Construction General Permit for your area. To complete this form, type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number
Provide the number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible permit numbers).

Section II. Operator Information
Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application. An operator of a project is a legal entity that controls at least a portion of site operations and is not necessarily the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS), also commonly referred to as your taxpayer ID. If the applicant does not have an EIN enter "NA" in the space provided. Also provide the operator's mailing address, telephone number, fax number (optional) and e-mail address (if you would like to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

Section III. Project/Site Information
Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

The applicant must also provide the latitude and longitude of the facility either in degrees, minutes, seconds; degrees, minutes, decimal; or decimal format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and EPA's web-based siting tools, among others. Refer to *www.epa.gov/npdes/stormwater/cgp* for further guidance on the use of these methodologies. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. Applicants must specify which method they used to determine latitude and longitude. If a U.S.G.S. topographic map is used, applicants are required to specify the scale of the map used.

Indicate whether the project is in Indian country, and if so, provide the name of the Reservation. If the project is in Indian Country Lands that are not part of a Reservation, indicate "not applicable" in the space provided.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 05/27/1998). Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest quarter acre. Note: 1 acre = 43,560 sq. ft.

Section IV. SWPPP Information
Indicate whether or not the SWPPP was prepared in advance of filing the NOI form. Check the appropriate box for the location where the SWPPP may be viewed. Provide the name,

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form This Form Replaces Form 3510-9 (8/98) Form Approved OMB Nos. 2040-0188 and 2040-0211

fax number (optional), and e-mail address (optional) of the contact person if different than that listed in Section II of the NOI form.

Section V. Discharge Information

Enter the name(s) of receiving waterbodies to which the project's storm water will discharge. These should be the first bodies of water that the discharge will reach. (Note: If you discharge to more than one waterbody, please indicate all such waters in the space provided and attach a separate sheet if necessary.) For example, if the discharge leaves your site and travels through a roadside swale or a storm sewer and then enters a stream that flows to a river, the stream would be the receiving waterbody. Waters of the U.S. include lakes, streams, creeks, rivers, wetlands, impoundments, estuaries, bays, oceans, and other surface bodies of water within the confines of the U.S. and U.S. coastal waters. Waters of the U.S. do not include man-made structures created solely for the purpose of wastewater treatment. U.S. Geological Survey topographical maps may be used to make this determination. If the map does not provide a name, use a format such as "unnamed tributary to Cross Creek". If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.

Indicate whether your storm water discharges from construction activities will be consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s). To answer this question, refer to *www.epa.gov/npdes/stormwater/cgp* for state- and regional-specific TMDL information related to the construction general permit. You may also have to contact your EPA regional office or state agency. If there are no applicable TMDLs or no related requirements, please check the "yes" box in the NOI form.

Section VI. Endangered Species Information

Indicate for which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of federally listed endangered and threatened species, and designated critical habitat. See Part 1.3.C.6 and Appendix C of the permit. If you select criterion F, provide the permit tracking number of the operator under which you are certifying eligibility. The permit tracking number is the number assigned to the operator by the Storm Water Notice Processing Center after EPA acceptance of a complete NOI.

Section VII. Certification Information

All applications, including NOIs, must be signed as follows:

For a corporation: By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (i) 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 (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

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

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch 2136, U.S. Environmental Protection, Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

Appendix F - Notice of Termination Form and Instructions

From the effective date of this permit, operators are to use the Notice of Termination Form contained in this Appendix to terminate permit coverage.

This Form Replaces Form 3517-7 (8-98)
Refer to the Following Page for Instructions

Form Approved OMB Nos. 2040-0086 and 2040-0211

NPDES Form

EPA

United States Environmental Protection Agency
Washington, DC 20460

Notice of Termination (NOT) of Coverage Under an NPDES General Permit for Storm Water Discharges Associated with Construction Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with construction activity under the NPDES program from the site identified in Section III of this form. All necessary information must be included on this form. Refer to the instructions at the end of this form.

I. Permit Information

NPDES Storm Water General Permit Tracking Number: _____

Reason for Termination (Check only one):

- ☐ Final stabilization has been achieved on all portions of the site for which you are responsible.
- ☐ Another operator has assumed control, according to Appendix G, Section 11.C of the CGP, over all areas of the site that have not been finally stabilized.
- ☐ Coverage under an alternative NPDES permit has been obtained.
- ☐ For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

II. Operator Information

Name: _____

IRS Employer Identification Number (EIN): ___ - _____

Mailing Address:

Street: _____

City: _____ State: ___ Zip Code: _____ - ____

Phone: ___ - ___ - _____ Fax (optional): ___ - ___ - _____

E-mail (optional): _____

III. Project/Site Information

Project/Site Name: _____

Project Street/Location: _____

City: _____ State: ___ Zip Code: _____ - ____

County or similar government subdivision: _____

IV. Certification Information

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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: _____

Print Title: _____

Signature: _____

Date: _____

Appendix G - Standard Permit Conditions

STANDARD PERMIT CONDITIONS

1. Duty To Comply

You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

A. You must comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

B. The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. §2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. §3701 note) (currently $27,500 per day for each violation).

   The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

C. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Pursuant to 40 CFR Part 19 and the Act, administrative penalties for Class I violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. §2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. §3701 note) (currently $11,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $27,500). Pursuant to 40 CFR Part 19 and the Act, penalties for Class II violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. §2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. §3701 note) (currently $11,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $137,500).

2. Duty to Reapply

If you wish to continue an activity regulated by this permit after the expiration date of this permit, you must apply for and obtain a new permit.

Instructions for Completing EPA Form 3510-13

Notice of Termination (NOT) of Coverage Under an NPDES General Permit for Storm Water Discharges Associated with Construction Activity

NPDES Form This Form Replaces Form 3517-7 (8-98) Form Approved OMB Nos. 2040-0086 and 2040-0211

Who May File an NOT Form

Permittees who are presently covered under the EPA-issued National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity may submit an NOT form when final stabilization has been achieved on all portions of the site for which you are responsible; another operator has assumed control in accordance with Appendix G, Section 11.C of the General Permit over all areas of the site that have not been finally stabilized; coverage under an alternative NPDES permit has been obtained; or for residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

"Final stabilization" means that all soil disturbing activities at the site have been completed and that a uniform perennial vegetative cover with a density of at least 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed. See "final stabilization" definition in Appendix A of the Construction General Permit for further guidance where background native vegetation covers less than 100 percent of the ground, in arid or semi-arid areas, for individual lots in residential construction, and for construction projects on land used for agricultural purposes.

Completing the Form

Type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number

Enter the existing NPDES Storm Water General Permit Tracking Number assigned to the project by EPA's Storm Water Notice Processing Center. If you do not know the permit tracking number, refer to *www.epa.gov/npdes/stormwater/cgp* or contact the Storm Water Notice Processing Center at (866) 352-7755.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box. Check only one:

Final stabilization has been achieved on all portions of the site for which you are responsible.

Another operator has assumed control according to Appendix G, Section 11.C over all areas of the site that have not been finally stabilized.

Coverage under an alternative NPDES permit has been obtained.

For residential construction only, if temporary stabilization has been completed and the residence has been transferred to the homeowner.

Section II. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application and is covered by the permit tracking number identified in Section I. The operator of the project is the legal entity that controls the site operation, rather than the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS). If the applicant does not have an EIN enter "NA" in the space provided. Enter the complete mailing address and telephone number of the operator. *Optional:* enter the fax number and e-mail address of the operator.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for termination of permit coverage to be valid.

Section IV. Certification Information

All applications, including NOIs, must be signed as follows:

For a corporation: By a responsible corporate officer. For the purpose of this Part, a responsible corporate officer means: (i) 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 (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

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

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOT form will not be considered valid termination of permit coverage.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 0.5 hours per notice, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, 2136, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Include the OMB number on any correspondence. Do not sent the completed form to this address.

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for you 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 permit.

4. Duty to Mitigate

You must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper Operation and Maintenance

You must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by you to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by you only when the operation is necessary to achieve compliance with the conditions of this permit.

6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. Your filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privileges.

8. Duty to Provide Information

You must furnish to EPA, within a reasonable time, any information which EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. You must also furnish to EPA upon request, copies of records required to be kept by this permit.

9. Inspection and Entry

You must allow EPA, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

A. Enter upon your premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

B. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

C. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

D. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

10. Monitoring and Records

A. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity.

B. You must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of EPA at any time.

C. Records of monitoring information must include:

   1. The date, exact place, and time of sampling or measurements;
   2. The individual(s) who performed the sampling or measurements;
   3. The date(s) analyses were performed

4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used; and
6. The results of such analyses.

D. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

E. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

11. Signatory Requirements

A. All applications, including NOIs, must be signed as follows:

1. For a corporation: By a responsible corporate officer. For the purpose of this Part, a responsible corporate officer means: (i) 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 (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
2. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or
3. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

B. All reports required by this permit, including SWPPPs, must be signed by a person described in Appendix G, Subsection 11.A above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described in Appendix G, Subsection 11.A;
2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
3. The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

C. Changes to Authorization. If an authorization under Subpart 2.1 is no longer accurate because a different operator has responsibility for the overall operation of the construction site, a new NOI satisfying the requirements of Subpart 2.1 must be submitted to EPA prior to or together with any reports, information, or applications to be signed by an authorized representative. The change in authorization must be submitted within the time frame specified in Subpart 2.2, and sent to the address specified in Subpart 2.3.

D. Any person signing documents required under the terms of this permit must include 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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is,

to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

E. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

12. Reporting Requirements

A. Planned changes. You must give notice to EPA as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b); or
2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR §122.42(a)(1).

B. Anticipated noncompliance. You must give advance notice to EPA of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Transfers. This permit is not transferable to any person except after notice to EPA. EPA may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See 40 CFR §122.61; in some cases, modification or revocation and reissuance is mandatory.)

D. Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit.

1. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by EPA for reporting results of monitoring of sludge use or disposal practices.
2. If you monitor any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by EPA.
3. Calculations for all limitations which require averaging of measurements must use an arithmetic mean.

E. Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

F. Twenty-four hour reporting.

1. You must report any noncompliance which may endanger health or the environment. Any information must be provided orally within 24 hours from the time you become aware of the circumstances. A written submission must also be provided within five days of the time you become aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
2. The following shall be included as information which must be reported within 24 hours under this paragraph.
   a. Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
   b. Any upset which exceeds any effluent limitation in the permit
   c. Violation of a maximum daily discharge limitation for any of the pollutants listed by EPA in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)

3. EPA may waive the written report on a case-by-case basis for reports under Appendix G, Subsection 12.F.2 if the oral report has been received within 24 hours.

G. Other noncompliance. You must report all instances of noncompliance not reported under Appendix G, Subsections 12.D, 12.E, and 12.F, at the time monitoring reports are submitted. The reports must contain the information listed in Appendix G, Subsection 12.F.

H. Other information. Where you become aware that you failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Permitting Authority, you must promptly submit such facts or information.

13. Bypass

A. Definitions.

1. Bypass means the intentional diversion of waste streams from any portion of a treatment facility

2. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which 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.

B. Bypass not exceeding limitations. You may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Appendix G, Subsections 13.C and 13.D.

C. Notice–

1. Anticipated bypass. If you know in advance of the need for a bypass, you must submit prior notice, if possible at least ten days before the date of the bypass.

2. Unanticipated bypass. You must submit notice of an unanticipated bypass as required in Appendix G, Subsection 12.F (24-hour notice).

D. Prohibition of bypass.

1. Bypass is prohibited, and EPA may take enforcement action against you for bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, 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 which occurred during normal periods of equipment downtime or preventive maintenance; and

c. You submitted notices as required under Appendix G, Subsection 13.C.

2. EPA may approve an anticipated bypass, after considering its adverse effects, if EPA determines that it will meet the three conditions listed above in Appendix G, Subsection 13.D.1.

14. Upset

A. Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond your reasonable control. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Appendix G, Subsection 14.C are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

C. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that you can identify the cause(s) of the upset;

2. The permitted facility was at the time being properly operated; and

3. You submitted notice of the upset as required in Appendix G, Subsection 12.F.2.b(24 hour notice).
4. You complied with any remedial measures required under Appendix G, Section 4.

D. Burden of proof. In any enforcement proceeding, you, as the one seeking to establish the occurrence of an upset, has the burden of proof.

07/08/05

Supersedes Spec. Attn. dated 10/1/92, 11/29/93, 9/11/97; 04/30/98

SPECIAL ATTENTION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER CONSTRUCTION GENERAL PERMIT REQUIREMENTS

Contractors are advised that 40 CFR Part 122 applies to this project. This provision prohibits point source discharges of storm water associated with construction activity to water bodies of the United States without a National Pollutant Discharge Elimination System (NPDES) storm water construction general permit.

This project is eligible for coverage under the reissued NPDES Storm Water Construction General Permit for Storm Water Discharge from construction sites which was published in the Federal Register Volume 68, No. 126 on Tuesday July 1, 2003. Contractors shall prepare and submit a copy of the Environmental Protection Agency (EPA), Notice of Intent (NOI) Form 3510-9 at least 7 days prior to commencement of construction on any site which will result in the disturbance of the land.

Other provisions of the General Permit requires a Storm Water Pollution Prevention Plan to be prepared, implemented, kept current, and maintained on the project site along with inspection reports; and when the project site has been finally stabilized and storm water discharges from construction activities have been eliminated, a Notice of Termination (NOT) Form 3510-7 must be prepared and submitted to the Environmental Protection Agency.

Attached is a copy of the Notice of Intent, a Notice of Termination, and an outline for a Construction (Storm Water) Pollution Prevention Plan.

An "active status" of the all submitted NOI's is required prior to commencing any work on the project.

On both the Notice of Intent (NOI) and the Notice of Termination (NOT) forms the information relative to the Facility Operator Information shall be that of the prime Contractor.

It is suggested to file NOI and NOT via the EPA website:
http://cfpub.epa.gov/npdes/stormwater/enoi.cfm.

GENERAL GUIDANCE FOR

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PREPARATION FOR THE NPDES GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

The Construction General Permit (CGP) issued by EPA, authorizes storm water discharges from large and small construction activities that result in a total land disturbance of equal or greater than one acre, where those discharges enter surface waters of the United States or a municipal separate storm sewer system (MS4) leading to surface waters of the United States subject to the conditions set forth in the CGP. The goal of this permit is to reduce or eliminate storm water pollution from construction activities by requiring planning and implementing appropriate pollution control practices to protect water quality.

The CGP requires development of a Storm Water Pollution Prevention Plan (SWPPP). The Department of Transportation (NHDOT) directs its contractors to prepare the SWPPP on its behalf. The following information is provided for general guidance in the development of the SWPPP. Such guidance will be in effect until otherwise noted.

Guidance Documents: A copy of the EPA "Storm Water Pollution Prevention Plan Checklist" is attached for reference. This document was published in 1992. Although it is helpful in developing the SWPPP, it may not be consistent with all the requirements in the 2003 Construction General Permit (CGP). Go to http://cfpub.epa.gov/npdes/stormwater/swppp.cfm, for additional guidance.

Contents of the SWPPP - A document labeled as a "**SWPPP**" shall be prepared and retained on the project site. The SWPPP shall be comprised of the following contents, and the requirements contained therein:

- Site activity and description.
- Controls to reduce pollution.
- Maintenance controls.
- NPDES General Permit for Discharges From Large and Small Construction Activities (CGP) registered on July 1, 2003
- Copy of the owner's and operator's NOI application filed with EPA
- A copy of EPA's acknowledgement letters, for both the owner and operator, noting receipt of, and administratively complete NOI
- Certification of documents as noted in the permit in Appendix G – Standard Permit Conditions page G-3, Section 11(D), signed by both the owner and operator.
- Documentation of permit eligibility related to Federally -listed endangered species, provided by the NHDOT upon request.
- Identification of non-storm water discharges
- Inspection reports
- Applicable state, tribal and local programs.

All of the pertinent information noted above shall be contained in one document labeled as a "SWPPP"

Making plans available - The SWPPP shall be prepared ***prior to*** the submission of the NOI to EPA. A copy of the SWPPP, NOIs, and acknowledgement letters from EPA must be retained at the construction site.

A sign or other notice containing the following information shall be posted at the construction site:

- Copy of the completed NOIs as submitted to the EPA Storm Water Notice Processing Center.
- If the location of the SWPPP or the name and telephone number of the contact person for scheduling SWPPP viewing times has changed, the current location of the SWPPP and name and telephone number of a contact person for scheduling viewing times.
- The SWPPP is to be kept at the construction facility during the entire construction period. The plans should be submitted to EPA for review ***only*** when requested by EPA.

Deadlines: The SWPPP shall be prepared ***prior to*** the submission of the NOI. The construction project must comply with the provisions of the plan throughout the construction period. The plan must be updated as appropriate. Reference the Special Attention (National Pollutant Discharge Elimination System (NPDES) Storm Water Construction General Permit Requirements) regarding the deadlines for submission of the NOI relative to the start of construction activities.

EPA BASELINE CONSTRUCTION GENERAL PERMIT REQUIREMENTS PRE-CONSTRUCTION CHECKLIST

Storm Water Pollution Prevention Plans

1. A site description, including:
   - ☐ The nature of the activity?
   - ☐ Intended sequence of major construction activities
   - ☐ The total area of the site
   - ☐ The area of the site that is expected to undergo excavation
   - ☐ The runoff coefficient of the site after construction is complete
   - ☐ Existing soil or storm water data
   - ☐ A site map with:
     - ☐ Drainage patterns
     - ☐ Approximate slopes after major grading
     - ☐ Area of soil disturbance
     - ☐ Outline of areas which won't be disturbed
     - ☐ Location of major structural and non-structural controls
     - ☐ Areas where stabilization practices are expected to occur
     - ☐ Surface waters
     - ☐ Storm water discharge locations
   - ☐ The name of the receiving water(s)
2. A description of controls:
   - 2.1 Erosion and sediment controls, including:
     - ☐ Stabilization practices for all areas disturbed by construction
     - ☐ Structural practices for all drainage/discharge locations
   - 2.2 Storm water management controls, including:
     - ☐ Measures used to control pollutants occurring in storm water discharges after construction activities are complete.
     - ☐ Velocity dissipation devices to provide nonerosive flow conditions from the discharge point along the length of any outfall channel.
   - 2.3 Other controls including:
     - ☐ Waste disposal practices which prevent discharge of solid materials to waters of the U.S.?
     - ☐ Measures to minimize offsite tracking of sediments by construction vehicles
     - ☐ Measures to ensure compliance with State or local waste disposal, sanitary sewer, or septic system regulations
   - 2.4 ☐ Description of the timing during the construction when measures will be implemented.
3. ☐ Are State or local requirements incorporated into the plans?
4. ☐ Are maintenance procedures for control measures identified in the plan?
5. ☐ Identification of allowable non-storm water discharges and pollution prevention measures.
6. ☐ Contractor certification.
7. ☐ Plan certification.

EPA BASELINE CONSTRUCTION GENERAL PERMIT CHECKLIST

Storm Water Pollution Prevention Plan
Construction/Implementation Checklist

1. Maintain Records of Construction Activities, including:
   - ☐ Dates when major grading activities occur
   - ☐ Dates when construction activities temporarily cease on a portion of the site
   - ☐ Dates when construction activities permanently cease on a portion of the site
   - ☐ Dates when stabilization measures are initiated on the site
2. Prepare Inspection reports summarizing:
   - ☐ Name of inspector
   - ☐ Qualifications of inspector
   - ☐ Measures/areas inspected
   - ☐ Observed conditions
   - ☐ Changes necessary to the SWPPP
3. Report Releases of Reportable Quantities of Oil or Hazardous Materials (if they occur):
   - ☐ Notify National Response Center 800/424-8802 immediately
   - ☐ Notify permitting authority in writing within 14 days
   - ☐ Modify the pollution prevention plan to include:
     - the date of release
     - circumstances leading to the release
     - steps taken to prevent reoccurrence of the release
4. Modify Pollution Prevention Plan as necessary to:
   - ☐ Comply with minimum permit requirements when notified by EPA that the plan does not comply
   - ☐ Address a change in design, construction operation or maintenance which has an effect on the potential for discharge of pollutants
   - ☐ Prevent reoccurrence of reportable quantity releases of a hazardous material or oil

EPA BASELINE CONSTRUCTION GENERAL PERMIT CHECKLIST

Storm Water Pollution Prevention Plan
Final Stabilization/Termination Checklist

1. ☐ All soil disturbing activities are complete
2. ☐ Temporary erosion and sediment control measures have been removed or will be removed at an appropriate time
3. ☐ All areas of the construction site not otherwise covered by a permanent pavement or structure have been stabilized with a uniform perennial vegetative cover with a density of 70% or equivalent measures have been employed

POLLUTION PREVENTION PLAN FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES
EROSION AND SEDIMENT CONTROL SELECTION CHECKLIST

INSTRUCTIONS: THIS CHECKLIST LISTS THE MINIMUM SEDIMENT EROSION CONTROL REQUIREMENTS UNDER THE USEPA GENERAL PERMIT. CHECK [✓] EACH ITEM AND FILL IN THE BLANKS BELOW TO EVALUATE COMPLIANCE FOR EACH DRAINAGE AREA AND LOCATION. NOTE: THIS CHECKLIST WAS PREPARED FOR THE USEPA GENERAL PERMIT. REQUIREMENTS FOR STATE GENERAL PERMITS MAY VARY.

Stabilization Practices

☐ Stabilization will be initiated on all disturbed areas where construction activity will not occur for a period of more than 21 calendar days by the 14th day after construction activity has permanently or temporarily ceased.

Stabilization measures to be used include:

☐ Temporary Seeding	☐ Sod Stabilization
☐ Permanent Seeding	☐ Geotextiles
☐ Mulching	☐ Other _____

Structural Practices

☐ Flows from upstream areas will be diverted from exposed soils. Measures to be used include:

☐ Earth Dike	☐ Pipe Slope Drain
☐ Drainage Swale	☐ Other
☐ Interceptor Dike and Swale	

Drainage locations serving less than 10 disturbed acres	Drainage locations serving 10 or more disturbed acres
☐ Sediment controls will be installed	☐ A Sediment Basin will be installed
Sediment controls include:	☐ A Sediment Basin is not attainable on the site; therefore, the following sediment controls will be installed:
☐ Sediment Basin	Sediment Trap
☐ Sediment Trap	Silt Fence or equivalent controls along the sideslope and downslope boundaries
☐ Silt Fence or equivalent controls along all sideslope and downslope boundaries	

Sediment Basin Runoff Storage Calculation

_____ acres area draining to the sediment basin

X
3,600 cubic feet of storage/acre
=

_____ cubic feet of storage required for the basin.

Attachment 3

Revised Storm Water Discharge Permit for Large and Small Construction Activities, Proposed Changes to General Permit for Storm Water Discharges—NMR150000, dated March 4, 2004

NEW MEXICO ENVIRONMENT DEPARTMENT

SURFACE WATER QUALITY BUREAU

STORM WATER at SWQB

Revised Storm Water Discharge Permit

for Large & Small Construction Activities

Proposed Changes to General Permit for Storm Water Discharges - NMR150000

Since the original conditional certification of this permit was issued on February 11, 2003, SWQB has acquired additional information concerning some of the procedures outlined in that document. As a result, SWQB has re-evaluated some of the conditions of certification and has concluded that the following revisions, while broadening the compliance options and better reflecting "real world" conditions, still provide reasonable assurance that the Construction General Permit, as conditioned, will be protective of state water quality standards. All other conditions of certification will remain unchanged.

State Certification of the Proposed NPDES Permit NMR150000
Submitted January 30, 2004
Revised Conditions of Certification

9.C.1.a.i The SWPPP must include site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control best management practices (BMPs) and/or other controls that are designed to prevent to the maximum extent practicable an increase in the sediment yield and flow velocity from pre-construction, pre-development conditions to assure that applicable standards in 20.6.4 NMAC, including the antidegradation policy, or WLAs are met. This requirement applies to discharges both during construction and after construction operations have been completed. The SWPPP must identify, and document the rationale for selecting these BMPs and/or other controls. The SWPPP must also describe design specifications, construction specifications, maintenance schedules (including a long term maintenance plan), criteria for inspections, as well as expected performance and longevity of these BMPs. BMP selection must be made based on the use of appropriate soil loss prediction models (such as SEDCAD 4.0, RUSLE, SEDIMOT II, MULTISED, etc.), or equivalent, generally accepted (by professional erosion control specialists), soil loss prediction tools. The operator(s) must demonstrate, and include documentation in the SWPPP, that implementation of the site-specific practices will assure that the applicable standards or WLAs are met, and will result in sediment yields and flow velocities that, to the maximum extent practicable, will not be greater than the sediment yield levels and flow velocities from pre-construction, pre-development conditions. The SWPPP must be prepared in accordance with good engineering practices by qualified (e.g., CPESC-certified, engineers with appropriate training, etc.) erosion control specialists familiar with the use of soil loss prediction models and design of erosion and sediment control systems based on these models (or equivalent soil loss prediction tools). The operator(s) must design, implement, and maintain BMPs in the manner specified

in the SWPPP.

9.C.1.b Storm water discharges associated with construction activity that the State has determined to be or may reasonably be expected to be contributing to a violation of an applicable standard, including the antidegradation policy, are not authorized by this permit.

Note: Upon receipt of this determination, NMED anticipates that, within a reasonable period of time, EPA will notify the general permittee to apply for and obtain an individual NPDES permit for these discharges per 40 CFR

Part 122.28(b)(3).

End of revisions.

Note: CPESC in the above 9.C.1.a.i means "Certified Professional in Erosion and Sediment Control." See http://www.cpesc.net/

For additional information and compliance assistance visit USEPA's Construction General Permit site on the internet. For questions concerning this or other NPDES storm water issues in New Mexico, contact Rich Powell directly.

PLEASE NOTE: Many Adobe® Acrobat® files within this site cannot be displayed or printed with older versions of the free Acrobat®Reader®. Make sure you're running the latest version **(5.0.5)** before trying to view or download any of the Acrobat® files found at this website!

Please send **comments, questions, bug reports** to Glenn Saums.

Questions or comments about this Web site? Please contact the NMED Communications Director.

Site Disclaimer

Last Updated 03.03.2004

Attachment 4

EPA Notice of Intent

This Form Replaces Form 3510-9 (8-98)
Refer to the Following Pages for Instructions

Form Approved OMB Nos. 2040-0188 and 2040-0211

NPDES Form

EPA

United States Environmental Protection Agency
Washington, DC 20460

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

Submission of this Notice of Intent (NOI) constitutes notice that the party identified in Section II of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section I of this form. Submission of this NOI also constitutes notice that the party identified in Section II of this form meets the eligibility requirements of the CGP for the project identified in Section III of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Refer to the instructions at the end of this form.

I. Permit Number

NMR150000

COPY

II. Operator Information

Name: Tetra Tech EC Inc

IRS Employer Identification Number (EIN): 25 - 1902191

Mailing Address:

Street: 1000 The American Road

City: Morris Plains State: NJ Zip Code: 07950 - 2446

Phone: 973 - 630 - 8000 Fax (optional): ___ - ___ - ____

E-mail (optional): ruben.juarez@tteci.com

III. Project/Site Information

Project/Site Name: Nitrate Abatement Ponds WP-26

Project Street/Location: Powerline/Pennsylvania

City: Albuquerque State: NM Zip Code: 87117 - ____

County or similar government subdivision: Bernalillo

Latitude/Longitude (Use one of three possible formats, and specify method)

Latitude
1. __° __' __" N (degrees, minutes, seconds)
2. __° __.__' N (degrees, minutes, decimal)
3. 35.0221° N (decimal)

Longitude
1. ___° __' __" W (degrees, minutes, seconds)
2. ___° __.__' W (degrees, minutes, decimal)
3. 106.5262° W (decimal)

Method: ☐ U.S.G.S. topographic map ☐ EPA web site ☐ GPS ☑ Other: ARC GIS 9.1

• If you used a U.S.G.S. topographic map, what was the scale: ____

Project Located in Indian country? ☐ Yes ☑ No

If so, name of Reservation or if not part of a Reservation, put "Not Applicable": ____

Estimated Project Start Date: 10 (Month), 02 (Date), 2006 (Year) Estimated Project Completion Date: 11 (Month), 01 (Date), 2006 (Year)

Estimated Area to be Disturbed (to the nearest quarter acre): ____.01

IV. SWPPP Information

Has the SWPPP been prepared in advance of filing this NOI? [✓] Yes [ ] No

Location of SWPPP for viewing: [✓] Address in Section II [ ] Address in Section III [ ] Other

If Other:

SWPPP Street: 3751 Wyoming Trailer South

City: Albuquerque

State: NM Zip Code: 87117 -

SWPPP Contact Information (if different than that in Section II):

Name: Ruben C Juarez

Phone: 505 - 301 - 4714 Fax (optional): 505 - 256 - 7343

E-mail (optional):

V. Discharge Information

Identify the name(s) of waterbodies to which you discharge. Surface- Minimal discharge, relining ponds that have been drying for some time

Is this discharge consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s)?

[✓] Yes [ ] No

VI. Endangered Species Information

Under which criterion of the permit have you satisfied your ESA eligibility obligations?

[✓] A [ ] B [ ] C [ ] D [ ] E [ ] F

- If you select criterion F, provide permit tracking number of operator under which you are certifying eligibility:

VII. Certification Information

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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: Ruben C Juarez

Print Title: Construction Site Superintendent

Signature: Ruben C J

Date: 9/22/06

EPA Form 3510-9 (Rev. 6/03)

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form | This Form Replaces Form 3510-9 (8/98) | Form Approved OMB Nos. 2040-0188 and 2040-0211

Who Must File an NOI Form

Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et.seq.; the Act), federal law prohibits storm water discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) Permit. Operator(s) of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must submit an NOI to obtain coverage under an NPDES general permit. Each person, firm, public organization, or any other entity that meets either of the following criteria must file this form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with SWPPP requirements or other permit conditions. If you have questions about whether you need an NPDES storm water permit, or if you need information to determine whether EPA or your state agency is the permitting authority, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755.

Where to File NOI Form

See the applicable CGP for information on where to send your completed NOI form.

Completing the Form

Obtain and read a copy of the appropriate EPA Storm Water Construction General Permit for your area. To complete this form, type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number

Provide the number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible permit numbers).

Section II. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application. An operator of a project is a legal entity that controls at least a portion of site operations and is not necessarily the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS), also commonly referred to as your taxpayer ID. If the applicant does not have an EIN enter "NA" in the space provided. Also provide the operator's mailing address, telephone number, fax number (optional) and e-mail address (if you would like to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

The applicant must also provide the latitude and longitude of the facility either in degrees, minutes, seconds; degrees, minutes, decimal; or decimal format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and EPA's web-based siting tools, among others. Refer to *www.epa.gov/npdes/stormwater/cgp* for further guidance on the use of these methodologies. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. Applicants must specify which method they used to determine latitude and longitude. If a U.S.G.S. topographic map is used, applicants are required to specify the scale of the map used.

Indicate whether the project is in Indian country, and if so, provide the name of the Reservation. If the project is in Indian Country Lands that are not part of a Reservation, indicate "not applicable" in the space provided.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 05/27/1998). Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest quarter acre. Note: 1 acre = 43,560 sq. ft.

Section IV. SWPPP Information

Indicate whether or not the SWPPP was prepared in advance of filing the NOI form. Check the appropriate box for the location where the SWPPP may be viewed. Provide the name,

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form This Form Replaces Form 3510-9 (8/98) Form Approved OMB Nos. 2040-0188 and 2040-0211

fax number (optional), and e-mail address (optional) of the contact person if different than that listed in Section II of the NOI form.

Section V. Discharge Information

Enter the name(s) of receiving waterbodies to which the project's storm water will discharge. These should be the first bodies of water that the discharge will reach. (Note: If you discharge to more than one waterbody, please indicate all such waters in the space provided and attach a separate sheet if necessary.) For example, if the discharge leaves your site and travels through a roadside swale or a storm sewer and then enters a stream that flows to a river, the stream would be the receiving waterbody. Waters of the U.S. include lakes, streams, creeks, rivers, wetlands, impoundments, estuaries, bays, oceans, and other surface bodies of water within the confines of the U.S. and U.S. coastal waters. Waters of the U.S. do not include man-made structures created solely for the purpose of wastewater treatment. U.S. Geological Survey topographical maps may be used to make this determination. If the map does not provide a name, use a format such as "unnamed tributary to Cross Creek". If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.

Indicate whether your storm water discharges from construction activities will be consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s). To answer this question, refer to *www.epa.gov/npdes/stormwater/cgp* for state- and regional-specific TMDL information related to the construction general permit. You may also have to contact your EPA regional office or state agency. If there are no applicable TMDLs or no related requirements, please check the "yes" box in the NOI form.

Section VI. Endangered Species Information

Indicate for which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of federally listed endangered and threatened species, and designated critical habitat. See Part 1.3.C.6 and Appendix C of the permit. If you select criterion F, provide the permit tracking number of the operator under which you are certifying eligibility. The permit tracking number is the number assigned to the operator by the Storm Water Notice Processing Center after EPA acceptance of a complete NOI.

Section VII. Certification Information

All applications, including NOIs, must be signed as follows:

For a corporation: By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (i) 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 (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

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

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch 2136, U.S. Environmental Protection, Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

Attachment 5

Storm Water Pollution Prevention Plan
for Construction Activities
Kirtland Air Force Base, Albuquerque, New Mexico

Kirtland Air Force Base
Albuquerque, New Mexico

Storm Water Pollution Prevention Plan *for* Construction Activities

January 21, 2004

2050 Wyoming Blvd. SE
Kirtland AFB, New Mexico 87117-5270

Certification of Storm Water Pollution Prevention Plan For Construction Activities

"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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

John R. Poland

Name

Director, Environmental Management Branch
377 MSG/CEV Kirtland AFB, N.M.

Title

21 Jan 04

Date

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Acronyms

AFB	Air Force Base (Kirtland)
BMP	Best Management Practice
EPA	U.S. Environmental Protection Agency
INRMP	Installation Natural Resources Management Plan
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
RUSLE	Revised Universal Soil Loss Equation
SCP	Sediment Control Plan
SOP	Standard Operating Procedure
SWPPP	Storm Water Pollution Prevention Plan

Section 1
Introduction

1.1 Purpose

This Storm Water Pollution Prevention Plan (SWPPP) was developed for Kirtland Air Force Base (AFB) in Bernalillo County, New Mexico for all construction activities, including both large and small sites. Large sites are defined as construction activities disturbing greater than or equal to 5 acres and small sites are defined as disturbing greater than or equal to 1 acre but less than 5 acres. The SWPPP was developed to be consistent with the U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Large and Small Construction Activities (Construction Storm Water Permit) (USEPA, 2003). A copy of this permit is provided in Appendix A.

This plan provides an overview of the type of construction activities that will occur at Kirtland AFB. It also includes descriptions of standard operating procedures that will be implemented during specific construction activities, as appropriate, to prevent or reduce pollutants in storm water discharges.

A variety of construction projects are constantly ongoing throughout Kirtland AFB. To provide for a streamlined process for compliance and coverage under the Construction Storm Water Permit, Kirtland AFB, as a facility, has applied for coverage under the NPDES Construction General Permit. This application will serve as an ongoing Notice of Intent (NOI) for the base to be covered by the Construction Storm Water General Permit. Per the Construction Storm Water General Permit, Kirtland AFB (the base) is eligible for coverage as an operator with operational control over construction plans and specifications. To administer and comply with the permit requirements and this SWPPP, Kirtland AFB has developed an internal system to identify, track, inspect, and administer the construction projects that occur on the base.

The base's standing coverage under the Construction General Permit will be only as an entity with operational control over construction plans and specifications at the facility (i.e., engineering control). The base does not exercise day-to-day control over individual construction projects conducted by contractors. The individual contractors that perform the work at specific construction sites on base must independently apply for coverage as the construction site operator with day-to-day control (the contractor).

The contractors will independently submit site-specific NOI packages directly to the EPA for each construction project, large or small, that is performed at Kirtland AFB. Submittal of and operation under an independent NOI is necessary because Kirtland AFB does not have direct control over the actions of contractor employees nor day-to-day control over the construction site or activities. Contractors also will submit additional project documentation and information regarding storm water practices and management to the appropriate Kirtland AFB offices. This will allow the base to evaluate and assess that

contracted operators working at Kirtland AFB are complying with applicable regulations. Submittal of project information to the appropriate Kirtland AFB offices does not relieve a contractor from the requirement under the Construction Storm Water Permit to independently apply for coverage as the site operator with day-to-day control.

1.2 SWPPP Format

To be consistent with the Construction Storm Water Permit, this SWPPP addresses the following elements:

- General site description
- Description of control measures or Best Management Practices (BMPs) that may be implemented to control pollutants in storm water discharges, as appropriate from site to site and activity to activity. Discussion of Sediment Control Plan (SCP) requirements to demonstrate appropriateness of BMPs
- Control measures maintenance procedures
- Inspection procedures
- Non-storm water discharge identification procedures

The main text of the SWPPP provides facility-wide information on these subjects. Additional site-specific information, maps, BMPs, and procedures for each individual construction project will be maintained by the Kirtland AFB Environmental Compliance Office using the template forms provided as attachments to the SWPPP. The individual package for each construction project that will be submitted internally to the Kirtland AFB Environmental Compliance Office is designated as the: *Kirtland AFB, Construction SWPPP, Project Compliance Documentation.*

Section 2
Site Description

2.1 Site Background

Kirtland AFB is located in central New Mexico, southeast of and adjacent to the City of Albuquerque city limits. The base is entirely located within Bernalillo County at the approximate latitude of 36°46′00′N and longitude of 108°21′15′W. The base is roughly 11 miles in distance from east to west and approximately 6 miles in distance from north to south with a total area of approximately 52,287 acres.

Prior to 1928, the area of Kirtland AFB was undeveloped rangeland. In 1928, Albuquerque's first municipal airport was constructed near the site of the current airport. Beginning in the 1930s and early 1940s, the municipal airport was used for transient fueling and maintenance stops for the military. The Albuquerque Army Air Base was constructed in 1941 for bomber combat crew training and in 1942 the airfield was renamed Kirtland Field. In 1947, Kirtland Field was redesignated Kirtland Air Force Base.

Over the years, ongoing training, research, and testing has, and continues to occur at Kirtland AFB. As part of ongoing operation under the Air Force Materiel Command, the base regularly has multiple construction projects simultaneously occurring at the base. This SWPPP has been developed to regulate those types of construction activities.

2.2 Site Map

Figure 2-1 shows a general site map of Kirtland AFB in relation to the State of New Mexico and the City of Albuquerque. This map is placed in the main body of the SWPPP text to provide a frame of reference for the location of the base as a whole and different areas of the base.

In addition to this general base map, for each individual construction project that will be conducted at the base, the contractor will submit two additional site-specific maps with the *Project Compliance Documentation*.

The first site specific map (*Map 1A*) will identify and illustrate the following items:

- The location of the construction site on Kirtland AFB
- Any onsite surface waters or wetlands
- General topography in the form of contour lines on a site plan
- Existing drainage patterns at the site, including areas where storm flow enters and exits the site

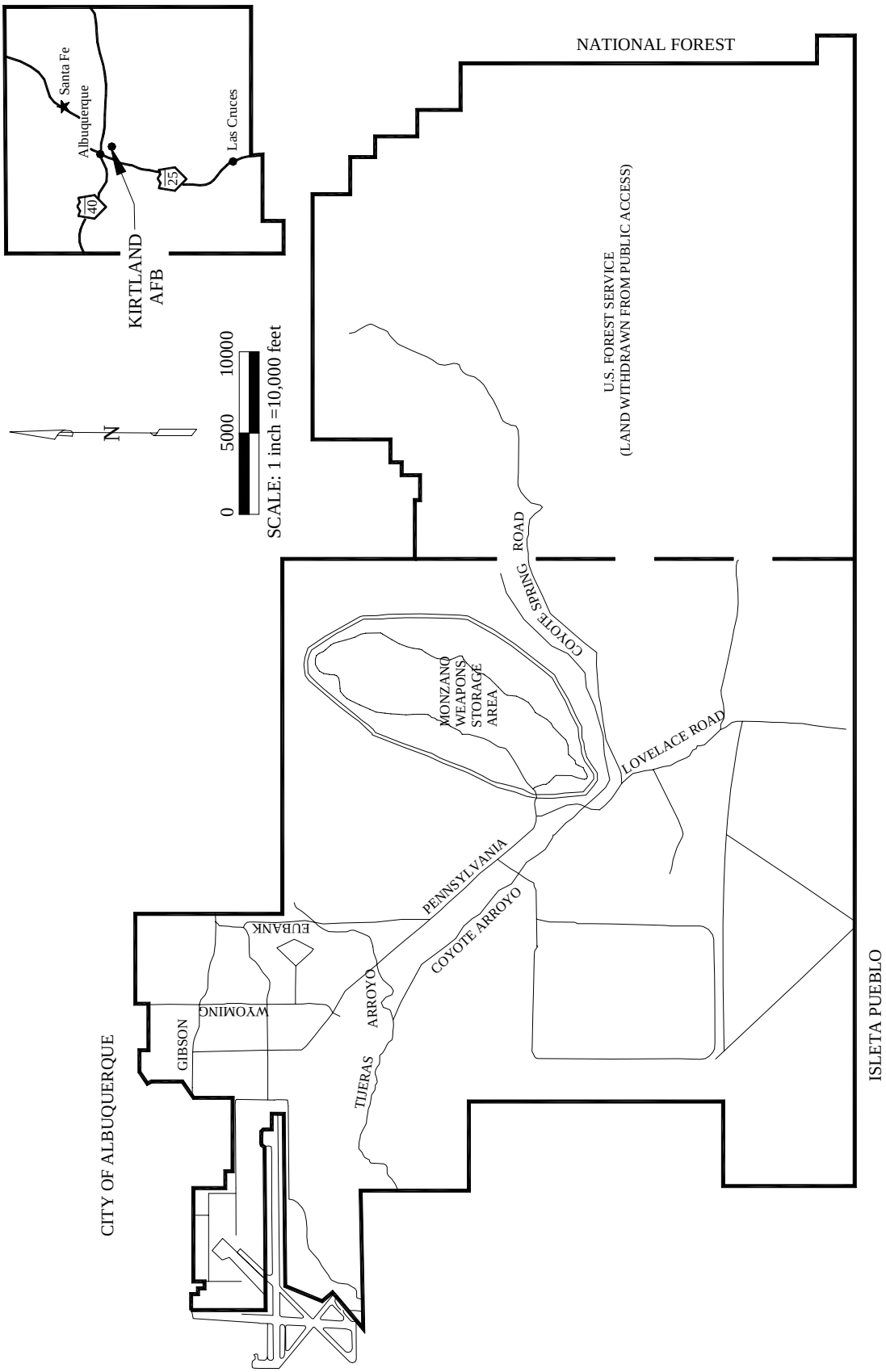

Figure 2-1. Kirtland AFB Location Map

Additionally, features unique to each type of construction activity that will occur at the site must be illustrated on a second specific site map as well (*Map 1B*) and include:

- Construction site boundaries
- Areas of soil disturbance
- Areas that will not be disturbed
- Areas of cut and fill
- Areas in which certain activities may be specifically restricted to (i.e., mobile asphalt batch plant will be placed and restricted to a given subarea of a site)
- Approximate slopes after major grading
- Locations of major erosion control facilities or structures
- Locations where stabilization practices are expected to occur
- Storm water discharge locations
- Any other unique feature to the site that will impact storm water management and control at the site

Copies of these onsite maps will be manually updated by the contractor as work progresses. Maps will be checked by Kirtland AFB Environmental Compliance personnel during regular ongoing inspections at the site throughout construction. If, or when, more than 25 percent of the information has changed from what was provided on the copies of *Map 1A* and *Map 1B* that were submitted with the *Project Compliance Documentation,* revised copies of the maps will be submitted to the Environmental Compliance Office.

2.3 A Description of the Construction Activities

2.3.1 Notice of Intent

As the facility owner, the base has submitted and operates under a standing NOI to discharge under the Construction Storm Water Permit as an operator with operational control over construction plans and specifications. The contractors performing individual projects at Kirtland AFB also will independently submit to EPA a site-specific NOI and operate under that NOI as the site operator with day-to-day control over activities at the site.

Additionally, construction projects that take place at Kirtland AFB will be required to complete an internal *Project Compliance Documentation* package and submit it to the Kirtland AFB Environmental Compliance Office. Along with the *Project Compliance Documentation* package, the contractors also must submit to Kirtland AFB a copy of their individual NOI that was submitted directly to the EPA.

Submittal of the internal Kirtland AFB *Project Compliance Documentation* package does not relieve the legal requirement of the contractor to submit an NOI under the Construction General Permit as the site operator with day-to-day control. Additionally, acceptance and

review of the *Project Compliance Documentation* package by the Kirtland AFB Environmental Compliance Office does not constitute acceptance, approval, or evaluation for appropriateness of the information submitted by the contractor directly to the EPA.

2.3.2 Categories of Construction Activities

Due to the varied nature of ongoing construction activities at Kirtland AFB, it is difficult to provide an all encompassing description of construction activities that will be performed under the Construction Storm Water Permit.

The basic categories of construction activities that will tend to be conducted at the base include:

- Building/structure new construction
- Building/structure expansion
- Building/structure renovation
- Building/structure demolition
- Paving/roadway construction
- Landscaping

Other types of construction activities, in addition to the basic categories listed above, will likely be conducted at the base during the tenure of this permit coverage. Specific construction activity information for each individual construction project that occurs at the base and is administered under this SWPPP will be submitted to the Environmental Compliance Office as part of *Attachment 1* of the *Project Compliance Documentation* package.

2.3.3 Potential Sources of Contamination from Construction Activities

Potential sources of pollutants that could result in discharges to storm water as a result of construction activities at the base include:

- Excavated/trenched/disturbed soil areas
- Excavated soil stockpiles
- Load and unloading areas
- Vehicle and equipment fueling areas
- Equipment staging areas
- Equipment maintenance areas
- Waste and material storage areas

Other potential sources of contamination, in addition to those items listed above, will likely occur at certain construction project sites. Specific information concerning potential contaminant sources for each individual construction project that occurs at the base and is administered under this SWPPP will be submitted to the Environmental Compliance Office as part of *Attachment 1* of the *Project Compliance Documentation* package.

2.4 Affected Area of the Site

The site area affected by construction activities will change for each individual project site administered under this SWPPP. For each individual construction project, a calculation of the area to be affected by the construction will be submitted to the Environmental

Compliance Office by the contractor as part of *Attachment 2* of the *Project Compliance Documentation* package.

2.5 Low Rainfall Erosivity Waiver

Under certain conditions construction projects that are classified as a small project (greater than or equal to 1 acre but less than 5 acres) may qualify for the low rainfall erosivity waiver under the General Permit provisions. If the low rainfall erosivity waiver conditions are met, then the requirements of the Construction Storm Water General Permit may be waived for that project. The semi-arid climate of the Kirtland AFB area suggests that many small construction projects may be able to meet the low erosivity factor requirement during the dry periods of the year. This waiver option is only available to projects that meet the definition of a small construction project.

To qualify for the waiver, a small construction project's erosivity factor (R) must be less than 5 during the entire period of construction activity. Calculation of the R factor is done using the Revised Universal Soil Loss Equation (RUSLE). The EPA is revising its guidance that provides direction on methods for using the RUSLE to calculate the R factor for a project. The erosivity factor determination is primarily based on the time of year in which the construction project will occur and the amount of rainfall during that period. To assist contractors in determining a project's eligibility for the low rainfall erosivity waiver, the Kirtland AFB Environmental Compliance Office has developed a construction project calendar that illustrates the periods of the year that meet the low rainfall criteria. The low rainfall erosivity project calendar and a brief explanation on its use is provided in Appendix C.

The contractor will be required to independently submit an appropriate waiver application with their direct submittals to EPA. A copy of the waiver application filed with the EPA will need to be submitted to the Kirtland AFB Environmental Compliance Office. If a project qualifies for a low rainfall erosivity waiver, the full *Project Compliance Documentation* package will not need to be submitted to the Kirtland AFB Environmental Compliance Office. Instead only the paperwork pertaining to the waiver application will need to be filed.

The EPA is expected to publish a formal low rainfall erosivity waiver form or make an electronic form submittal available on the Internet. Until a formalized waiver form is available, the Construction Storm Water General Permit indicates an operator seeking the low rainfall erosivity waiver should provide and certify to the following information:

1. Name, address and telephone number of the construction site operators;
2. Name (or other identifier), address, county or similar governmental subdivision, and latitude/longitude of the construction project or site;
3. Estimated construction start and completion (i.e., final stabilization) dates, and total acreage (to the nearest quarter acre) to be disturbed;
4. The rainfall erosivity factor calculation that applies to the active construction phase at your project site; and

5. A statement, signed and dated by an authorized representative as provided in Appendix G, Subsection 11 of the Construction Storm Water General Permit that certifies that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than 5.

2.6 Topography and Vegetation

The topography and vegetation of Kirtland AFB ranges from relatively flat, undeveloped, areas vegetated with scrub, to floodplain areas with wetland vegetation, to steep forested, mountainous areas, to flat, paved, densely developed and populated areas. For each individual construction project, a brief description of the topography and vegetation of the area to be affected by the construction will be submitted to the Environmental Compliance Office as part of *Attachment 2* of the *Project Compliance Documentation* package.

2.7 Regional and Site Surface Hydrology

The primary regional surface hydrology feature on Kirtland AFB is Tijeras Arroyo, which ultimately discharges into the Rio Grande. Surface water across the base is conveyed largely by roadways, storm water structures, and ephemeral streams draining towards Tijeras Arroyo or into the physically interconnected City of Albuquerque storm drain system. In many cases, sheet flow and runoff from across the base may pond, evaporate, or infiltrate prior to reaching a distinct surface water body. Storm drainage that enters the City of Albuquerque storm drain system is ultimately discharged to the Rio Grande as well.

2.8 Location and Description of Any Anticipated Industrial Storm Water or Non-Storm Water Components

2.8.1 Industrial Storm Water Discharges

Industrial activities at Kirtland AFB fall under the NPDES Storm Water Multi-Sector General Permit for Industrial Activities. Therefore, the base industrial activities operate in compliance with a SWPPP that has been specifically developed to comply with those permit requirements.

No regulated industrial activities are anticipated to occur nor would generally qualify for coverage under the Construction Storm Water Permit SWPPP. Possible exceptions are discharges from dedicated mobile asphalt and dedicated concrete plants. To be covered under the Construction Storm Water Permit, this SWPPP, and the submitted *Project Compliance Documentation* package for a specific construction site, an asphalt or concrete plant must be specifically dedicated to an individual project site. In this case, the activities at that dedicated concrete or asphalt plant would be indicated as one of the ongoing construction activities at a given site and appropriate BMPs would be selected and implemented for those operations. Mobile asphalt and mobile concrete plants (plants that operate independently of a specific construction project site and/or that may provide material to multiple construction sites) cannot be covered by this SWPPP and would be

required to operate under individually developed SWPPPs, for either large or small construction sites, depending on the footprint size of the mobile plant.

Although not anticipated, should any specific construction projects have associated industrial storm water discharges that qualify for coverage under the Construction Storm Water Permit and this SWPPP, the information regarding those discharges will be submitted to the Environmental Compliance Office on *Attachment 3* to the *Project Compliance Documentation* package.

2.8.2 Allowable Non-Storm Water Discharges

There are certain non-storm water discharges that are considered allowable discharges and would be covered under this SWPPP. These allowable non-storm water discharges include:

- Discharges from firefighting activities or hydrant flushings
- Dust suppression activities
- Potable water from line flushings
- Uncontaminated air conditioning or compressor condensate
- Pavement washwaters, assuming no detergents have been used and no spills or leaks of hazardous or toxic materials have occurred
- Waters used to wash vehicles where detergents are not used
- Routine external building washwater, assuming no detergent has been used
- Uncontaminated spring or groundwater
- Foundation or footing drains, assuming flows are not contaminated

Some of these types of discharges can be predicted and expected at a construction site (i.e., landscape irrigation) while others are not expected or anticipated to occur (i.e., discharges from firefighting activities). Those allowable non-storm water discharges that can be predicted and/or expected at a site should be indicated by the contractor on *Attachment 3* of the *Project Compliance Documentation*. If unanticipated allowable non-storm water discharges occur during the course of the project, the *Project Compliance Documentation* should be updated appropriately.

2.9 Impacts of Construction Projects on Endangered or Threatened Species, Designated Critical Habitat, or Historic Properties

Consistent with the conditions of the Construction Storm Water Permit, the impacts of storm water discharge-related activities on federally listed endangered and threatened species, and designated critical habitat must be assessed. The U.S. Fish and Wildlife

Service's list of endangered and threatened species of concern for Bernalillo County, New Mexico includes five species. These species include the following:

- Southwestern Willow Flycatcher
- Bald Eagle
- Mexican Spotted Owl
- Black-footed Ferret
- Rio Grande Silvery Minnow

Additionally, critical habitats for the following species have been identified as potentially occurring in Bernalillo County:

- Loggerhead Shrike
- Burrowing Owl
- Gray Vireos
- Rio Grande Silvery Minnow

Of these species, no habitat or occurrence of the Rio Grande Silvery Minnow would occur on Kirtland AFB. That species only occurs within the Rio Grande, which is not present within in the boundaries of Kirtland AFB. Habitat for the remaining four threatened and endangered species does occur throughout Kirtland AFB and these species are either documented to be present or could potentially be present, even if undocumented, on the base. Likewise critical habitat for the other three species also could occur at potential construction site locations at the base.

The potential impacts construction projects may have on endangered or threatened species of concern or critical habitats will be evaluated for each project area in accordance with the National Environmental Policy Act (NEPA) process and the Kirtland AFB Installation Natural Resources Management Plan (INRMP) (2001). The Kirtland AFB Natural Resources Office staff will review construction project information and determine if there are endangered or threatened species in the project area.

If the Kirtland AFB Natural Resources Office evaluation of a project indicates that endangered or threatened species are present, or are likely to be present, the Natural Resources Office staff will issue to the contractor any special conditions, requirements, and restrictions that will be necessary to protect the species of concern. Additional site inspections by Natural Resources Office staff before, during, and after construction activities may be conducted to ensure protection of the species of concern.

Likewise, the potential impacts construction projects may have on historic properties or culturally significant sites also will be evaluated for each project area in accordance with the NEPA process. Generally, construction activities are not anticipated to occur in areas where storm water or other allowable non-storm water discharges from the site will impact historic properties or culturally significant sites. Therefore, with regard to historic properties, Kirtland AFB projects will typically qualify for coverage under Criterion A of the Construction Storm Water Permit. The Kirtland AFB Environmental Compliance Office staff will review construction project information for individual sites to assess the presence of any historic properties or culturally significant locations at a site.

For a construction project where storm water run-off may impact an historic property or culturally significant site measures will be taken to ensure that coverage is sought under the appropriate eligibility criterion of the permit. The Environmental Compliance Office will issue to the contractor any special conditions, requirements, and restrictions that will be necessary to protect the site(s) in question. Additional site inspections by Environmental Compliance Office staff before, during, and after construction activities may be conducted to ensure protection of the site(s) in question.

Section 3
Best Management Practices for Storm Water Pollution Prevention

As previously discussed throughout this document, conditions, activities, and appropriate management practices will vary for each individual construction site at the base. This section of the SWPPP provides a listing of best management practices (BMPs) and standard operating procedures (SOPs) the base anticipates typically being used for the types of construction activities expected to occur at Kirtland AFB. Appropriate and necessary BMPs and SOPs will be evaluated and selected by the contractors for each construction activity and each construction project. The selected information will be submitted by the contractor to the Environmental Compliance Office as part of the *Project Compliance Documentation* package.

The types of BMPs described in the sections below shall be implemented as appropriate to prevent and control storm water run-on and run-off and to limit exposure of storm water to contaminants during construction activities at individual sites at Kirtland AFB. The description of BMPs and controls includes:

1. Control measures to reduce exposure of potential pollutant sources to storm water during construction activities
2. Erosion and sediment controls, including both structural and stabilization practices
3. Management practices for materials handling
4. Practices for spill prevention, control, and response

3.1 Control Measures for Pollutant Sources During Construction Activities

Potential types of pollutant sources were described previously in Section 2. Site-specific pollutant sources will be furthered identified for each construction site in *Attachment 4* of the *Project Compliance Documentation* package.

Measures to control and prevent the contact of storm water with the different types of pollution sources expected to be present at construction sites at Kirtland AFB are summarized in the sections below.

3.1.1 Excavated/Trenched Areas

- The amount of excavated, trenched, or disturbed soil areas will be kept as minimal as practicable while conducting site activities.

- Due to the difficulty in avoiding contact of storm water with excavated or trenched areas, mobilization of contaminants in storm water runoff will be prevented mainly through the use of BMPs implemented as erosion and sediment controls.

3.1.2 Soil Stockpiles

- Soil stockpiles will be covered when not being used on a regular basis.
- Stockpiles will be bermed to divert run-on and contain runoff from the areas.
- The number of soil stockpiles will be kept to a minimum at a site.
- Due to the difficulty in avoiding contact of storm water with soil stockpiles, mobilization of contaminants in storm water runoff will be prevented mainly through the use of BMPs implemented as erosion and sediment controls.

3.1.3 Loading and Unloading Areas

- Loading and unloading will be confined, as much as practicable, to designated areas of the site to prevent spillage and disturbance to multiple areas.
- Materials spilled during loading and unloading operations will be cleaned up immediately, including soils on the outside of the trucks (i.e., the side rails) and on the ground or road surface.

3.1.4 Vehicle and Equipment Fueling Areas

- Fueling will be conducted only in designated site areas.
- Fueling stations will have temporary secondary containment around the fuel tanks.
- Complete fueling of vehicle and equipment will be conducted each time to minimize the number of fueling operations.

3.1.5 Equipment Staging Areas

- Equipment will be staged, as practicable, in designated areas.
- Equipment will be properly serviced and maintained to avoid leaks and spills of fuel, oils, or lubricants from the equipment.
- Equipment with known drips or leaks will be staged in areas covered with plastic sheeting to avoid contaminants being dripped or leaked onto the soil.
- Any fuel, lubricants, hydraulic oils, etc. associated with equipment staging areas will be properly stored in temporary, impervious, secondary containment areas to minimize contact with the soil and the potential for leaks or spills.

3.1.6 Vehicle and Equipment Maintenance Areas

- No vehicle maintenance will be performed on/at the construction site.
- If emergency vehicle maintenance is necessary, it will be performed over an impervious surface to prevent potential leaks and spills from contacting the soil.

- Any spills or leaks from equipment or vehicles will be cleaned up immediately.
- Precautions will be taken to prevent the release of pollutants to the environment from equipment maintenance and all spent oils or equipment fluids will be properly disposed of offsite.
- Precautions during maintenance activities will include the use of drip pans, mats, and other similar methods.
- Any fuel, lubricants, hydraulic oils, etc. associated with equipment staging areas will be properly stored in temporary, impervious secondary containment areas to minimize contact with the soil and the potential for leaks or spills.
- No vehicles will be washed at the site. However, in the event that an exception is allowed, no vehicle washwater shall be allowed to run off the construction site or enter watercourses.

3.1.7 Waste and Material Storage Area:

- Materials on the construction site will be in stored in areas designated for that purpose.
- Suitable measures will be taken in storage areas to reduce the likelihood of a discharge and prevent the contact of storm water with waste material or raw product material (i.e., concrete mix, paints, varnishes).
- Berming or secondary impervious containment, as practicable, should be implemented to prevent or divert storm water from contacting waste materials or raw products.
- Waste materials will be removed from the site on a regular basis.

3.2 Erosion and Sediment Controls

3.2.1 Goals

The use and implementation of erosion and sediment control practices at construction sites on Kirtland AFB should incorporate the following goals and criteria, as appropriate:

- Implement erosion and sediment controls during construction to retain sediment onsite to the extent practicable.
- Select, install, and maintain control measures in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicate that a control measure has been used inappropriately or incorrectly, that control measure will be modified or replaced as necessary.
- In the event that sediment escapes the construction site, remove offsite accumulations of sediment to minimize offsite impacts.
- Remove sediment from sediment traps or sedimentation ponds when design capacity has been reduced by 50 percent.

- Implement practices at the site that prevent litter, construction debris, and construction chemicals that are or could be exposed to storm water from becoming a pollutant source for storm water discharges.
- Offsite material storage areas used exclusively by a given project will be considered as part of that project and should be addressed and managed as outlined in the SWPPP and as indicated in the selected project BMPs. The square footage and/or acreage of any offsite storage areas must be included as part of the total size of the construction site reported in *Attachment 2* of the *Project Compliance Documentation.*

3.2.2 Structural Control Measures

There are a variety of structural controls that may be used to limit or prevent storm water run-on to construction sites and/or control the quality of the storm water run-off from the construction sites. Structural control practices include approaches such as the use of straw bales, silt fences, earth dikes, drainage swales, sediment traps, and sediment basins. Table 3-1 provides a list of commonly implemented structural controls that may be put in place during different construction activities and/or at different sites. Applicable and appropriate structural control measures will be selected for each individual construction project at Kirtland AFB. Selected measures may include some of those summarized in Table 3-1 and/or may include other approaches and measures that are appropriate for a given type of activity or site. The specific structural control measures that will be implemented for each construction project will be submitted to the Environmental Compliance Office in *Attachment 5* of the *Project Compliance Documentation* package.

3.2.3 Stabilization Practices

There are a variety of stabilization practices that may be used to control the quality of the storm water run-off from the construction sites. Stabilization practices may include temporary or permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, and preservation of mature vegetation. Table 3-2 provides a list of commonly implemented stabilization practices that may be put in place during different construction activities and/or at different sites. Applicable and appropriate stabilization practices will be selected for each individual construction project at Kirtland AFB. Selected measures may include some of those summarized in Table 3-2 and/or may include other approaches and measures that are appropriate for a given type of activity or site. The specific stabilization practices that will be implemented for each construction project at Kirtland AFB during the construction phase will be submitted to the Environmental Compliance Office in *Attachment 5* of the *Project Compliance Documentation* package. Records

TABLE 3-1
Structural Control Measures That May Be Implemented at Construction Sites

Kirtland AFB SWPPP

Control Measure	Location	Description of Control Measure
Silt Fencing	Along the perimeter of the excavation sites. Drainage areas should be less than 0.25 acre per 100 feet of fence length.	To protect streams or wetland areas, to prevent erosion, and to keep sediment onsite. Silt fencing consists of posts with filter fabric stretched across the posts. The lower end of the fence is vertically trenched and covered with back fill. This prevents water from passing by the fence without being filtered. The fabric allows for the water to pass offsite while retaining the sediment onsite.
Straw Bales	Installed around areas requiring protection such as wetlands to form a temporary containment.	Straw bales work much like silt fencing and may be used instead of silt fence. They can be used to form a barrier or redirect water. They impede storm water flow. Unlike silt fence, straw bales do not allow water to flow through freely, thus they are used where detention, not just filtration, is necessary.
Erosion Control Blankets	Installed in areas requiring protection of exposed soil and/or additional stabilization	Erosion control blankets provide protection of disturbed soil areas to minimize erosion and soil transport
Inlet Protection	Located around inlet areas to the storm sewer system.	Filtering material placed around an inlet to a receiving stream to trap sediment. It can be composed of gravel, stone with a wire mesh filter, block and gravel or straw bales.
Earth dikes/berms	Installed in areas where storm water flow needs to be diverted around a potential contaminant source	Earth dikes and berms act to divert storm water flow around or away from areas where soils are disturbed or stockpiled or where potential contaminants are located in order to avoid contact of the storm water with those pollutant sources of concern.
Check Dams	On the average, where the grade change is more than 2 percent or where possible.	A check dam is a small, temporary dam constructed across a drainage ditch or channel. Its purpose is to slow down the speed of the concentrated flows. The reduced runoff speed will result in less erosion and gulling in the channel and allow the sediment to settle out. The check dams can be built with materials such as straw bales, rock, timber, or other material that will retain water.

TABLE 3-1
Structural Control Measures That May Be Implemented at Construction Sites

Kirtland AFB SWPPP

Control Measure	Location	Description of Control Measure
Sediment Basins	Sediment basins are required for drainage locations that serve 10 or more disturbed acres at one time. For drainage locations serving less than 10 acres, smaller sediment basins or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required.	Sediment basins are either temporary or permanent settling ponds with a controlled storm water release structure. Their function is to collect and store sediment-laden storm water from construction activities long enough to allow the sediment to settle out.
Stream Crossings	Crossings may be necessary when working near or close to wetland areas. Areas of use will be determined in the field.	Bridge or culvert across a stream or watercourse for short-term use. The purpose is to prevent the damage to watercourses that would occur if vehicles were driven in the wetlands.
Temporary swales	In low areas and at site boundaries, as appropriate	Temporary swales provide a preferential pathway for water flow to prevent erosion and provide a location for accumulation of sediment and debris
Minimize and smooth ground irregularities that concentrate surface flow	Where slope cuts from erosion have developed (particularly along the faces of flood detention structures), remove loose granular material and fill the area with suitable soils to the original profile of the bank or slightly above the original profile	Irregularities and slope cuts that are not properly or completely filled, may encourage erosion and may cause redevelopment of the cut. Inspect the area upstream from a developed cut carefully to determine if there was an irregularity in the ground profile that caused storm water to concentrate and erode the soils. Any such irregularity should be removed using the most appropriate procedure to ensure that water runs off the site as sheet flow.
Limit Entrance/Exit	Designated construction site entrances/exits.	The purpose is to reduce tracking of soil off the site. These entrance/exits are usually constructed of fabric and large stone. The fabric is laid down on the soil; the rock is then applied on top of the fabric. The rough surface will shake and pull the soil off the tires.

TABLE 3-2
Stabilization Control Measures That May Be Implemented At Construction Sites

Kirtland AFB SWPPP

Control Measure	Location	Description of Control Measure
Preservation of Natural Vegetation	Wherever practical.	Wherever possible, existing vegetation should be retained. It minimizes erosion potential and protects water quality.
Temporary seeding	On appropriate disturbed areas if construction is complete or suspended for an extended period of time but prior to the entire site being permanently reseeded.	Provides stabilization of the soil and reduces erosion.
Permanent seeding	On appropriate disturbed areas once construction is complete and within 30 days.	Provides stabilization of the soil and reduces erosion.
Sod stabilization	On appropriate areas where rapid stabilization and protection of disturbed ground surface is desirable and/or where it will be difficult to perform reseeding	Provides stabilization of the soil and reduces erosion and protects water quality
Mulching	On slopes steeper than 2:1 or on areas that have been seeded. Must be implemented within 14 days of activity ceasing.	Soil stabilization or erosion control practices where materials such as grass wood chips, hay, etc. are placed on the soil surface to protect disturbed soil areas and/or to allow seeded areas to become established
Vegetative buffer strips	As appropriate and possible vegetative buffer strips should be retained or installed between large areas of disturbed soil or pavements.	Vegetative buffer strips intercept and slow sheet flow moving across disturbed or paved areas. These strips improve water quality, reduce erosion potential, and assist in retaining sediment onsite
Furrow-contour sidehill slopes	Sidehill slopes of exposed soil	Will minimize wind and water erosion, and will also “roughen” the earth to provide a microclimate of wind protection for new plants, and will help conserve precipitation for use in growth of new seed. This results in a reduction of sediment erosion.
Geotextiles	As appropriate on disturbed areas or slopes	Geotextiles cover and stabilize disturbed soils and slopes to reduce erosion potential.

and dates of major grading events, periods when construction is permanently or temporarily ceased on a portion of the sites, and dates stabilization measures are initiated should be maintained with the SWPPP. Additionally, a description of the final stabilization that will be implemented at a given site, after all construction activities are complete also will be provided in *Attachment 5 of the Project Compliance Documentation*.

3.2.4 Sediment Control Plan Requirements

To comply with the EPA requirements in the Construction General Permit specifically for New Mexico, a Sediment Control Plan (SCP) must be included as part of individual construction project SWPPPs. The SCP must demonstrate, through "appropriate soil loss calculations or models (such as SEDCAD 4.0, RUSLE, SEDIMONT II, MULTISED, etc.)" (USEPA, 2003), that selected BMPs are appropriate to ensure sediment yields do not increase during or after construction of the project prior to final stabilization. These types of calculations incorporate site-specific information on soil type, slope, vegetation, management methods (i.e., BMPs), etc. along with database values on rainfall to estimate potential sediment yield.

An SCP is very specifically linked to the individual construction project for which it is developed. Kirtland AFB, as an operator with operational control over general construction plans and specifications at the base, but not specific involvement in actual day-to-day execution of construction projects, is not in a position to develop or certify to individual SCPs. Therefore, the base's ability to comply with the SCP requirement of the Construction General Permit is limited.

Kirtland AFB's method of complying with the SCP requirement is to document that contractors executing work at the base follow the SCP process requirements in the permit. The base's documentation protocol is the requirement that contractors complete the SCP information included in *Attachment 5* of the *Project Compliance Documentation*. The base will verify that an appropriate SCP process has been utilized but will not explicitly review or verify the correctness of the SCP calculations or certify to the appropriateness of the SCP. The current requirement in the Construction General Permit for a professional engineer's certification of the SCP is viewed as sufficient evidence of the correctness of a contractors' SCP.

3.3 Controls for Materials Handling

Applicable and appropriate materials handling controls will be selected for each individual construction project at Kirtland AFB. Selected practices may include some of those summarized in Table 3-3 and/or may include other approaches and measures that are appropriate for a given type of activity or site. The materials handling controls that will be implemented for each construction project will be submitted to the Environmental Compliance Office in *Attachment 5* of the *Project Compliance Documentation* package.

TABLE 3-3
Materials Handling Control Measures That May Be Implemented At Construction Sites

Kirtland AFB SWPPP

Control Measure	Description of Control Measure
Good housekeeping	General good housekeeping should be conducted at all times at the construction site. The project area should be kept free, as much as practicable, from trash, spilled fuels or oils, and miscellaneous construction debris
Provision of trash receptacles	Trash receptacles (i.e dumpsters or garbage cans) should be provided for daily domestic-type trash and garbage. Receptacles should be sturdy and placed in areas where they will not be knocked or blown over. Receptacles should be emptied on a regular basis.
Trash removal	Domestic type garbage from trash receptacles, construction or materials packaging, and other general trash and debris should be removed from the site on a regular basis
Material Safety Data Sheets (MSDSs)	MSDSs for substances used or stored on the construction site will be available for review and use
Materials inventory	Materials stored onsite shall be inventoried. Additional materials brought onsite will be recorded.

3.4 Spill Prevention, Control, and Response Practices

The following basic spill prevention, control, and response plan shall be implemented as part of the Construction Storm Water Permit SWPPP for construction activities at Kirtland AFB. This basic spill prevention and response plan is not intended to suffice for or replace spill plans required by other regulations.

Spill prevention, control, and response actions may vary for each construction site at Kirtland AFB. Any divergences from the below outlined plan for a specific site, activity, or project will be submitted to the Environmental Compliance Office as *Attachment 6* of the *Project Compliance Documentation* package.

3.4.1 Spill Prevention

- The types and quantities of toxic materials at a construction site should be minimized to the extent practicable. If significant quantities of a certain toxic materials or other pollutants do need to be used at a site, a specific procedure for material containment and spill prevention for that material and quantity should be developed and implemented. Such specific procedures should be submitted in *Attachment 6* of the *Project Compliance Documentation* package.

- For sites that have temporary fuel tanks, the following fuel oil spill prevention procedure will be implemented:
  - All stationary fuel or chemical tanks located on soil shall be bermed with a perimeter dike of native material or be inside an open tank capable of containing 200 percent of the maximum capacity of the tank in case of rupture. Dikes shall have 2:1 side slopes with a 1-foot freeboard. Areas inside the dike will be covered with an appropriate impervious material to minimize soil contamination in the event of a spill. The impervious materials will be durable enough to remain intact for the duration of the project.
  - All construction activities requiring mobile fuel tanks shall have an adequate number of oil sorbant cellulose socks or dry solvent absorber kept on the fuel truck to contain minor spills.

3.4.2 Mitigation and Cleanup of Spills

The following procedures should be adhered to in order to mitigate and/or cleanup spills of materials that may occur at construction sites. For additional guidance on spill cleanup the Kirtland AFB Spill Plan should be consulted.

- All fueling operations should be performed at designated facilities, when practical.
- Spill sumps will be constructed around all fuel and oil tanks. Drip pans will be used underneath oil barrels and other fluids used during the construction activities.
- Spills of toxic or hazardous materials should be reported immediately to 911 and/or the Kirtland AFB Fire Department and/or the Kirtland AFB Command Post (phone #(505) 846-3777).
- Following reporting of spills to the appropriate emergency response facilities, the Kirtland AFB Environmental Compliance Office should be notified as soon as practicable.

3.4.2.1 Small Spills

The following procedure will be followed for the cleanup of **small** spills.

1. Upon detection of any spill, the first response shall be to assure personal safety. The area of the spill and the nature of the spilled material shall be evaluated to determine if remedial actions could result in additional health hazards, in escalation of the spill, or in facility damage that may escalate the problem. If such conditions exist, a guard should be posted near the area (if possible).
2. If the spill is of toxic or hazardous materials, it should be reported immediately to 911 and/or the Kirtland AFB Fire Department and/or the Kirtland AFB Command Post (phone #(505) 846-3777).
3. As soon as practicable report spill to the Kirtland AFB Environmental Compliance Office.
4. Identify the source of the spill (if possible) and stop the flow of pollutants if it can be done in a safe manner as described above.

5. Record pertinent facts and information about the spill on the Kirtland AFB Spill Form contained in the Kirtland AFB Spill Plan (Appendix A of that document) (September 2000). The types of information recorded should include the following:

    - Type of pollutant
    - Location
    - Apparent source
    - Estimated volume
    - Time of discovery

6. Spread granular absorbent materials or use oil sorbant cellulose pads on the area to soak up as much of the liquid as possible and prevent infiltration into the soil.

7. Excavate the contaminated soil, as soon as possible and if necessary, and transport it to an appropriate site that has been approved by the Kirtland AFB Environmental Compliance Office.

8. If immediate transfer of the contaminated soil is not practical, excavate and place the contaminated soil on a double thickness sheet of 10-mil polyethylene film, and form a small berm under the outer edges of the poly film to prevent breakout or infiltration during rain or snowstorms.

3.4.2.2 Medium to Large Spills

The following procedure will be followed for the cleanup of **medium to large** spills.

1. Upon detection of any spill, the first response shall be to assure personal safety. The area of the spill and the nature of the spilled material shall be evaluated to determine if remedial actions could result in additional health hazards, in escalation of the spill, or in facility damage that may escalate the problem. If such conditions exist, a guard should be posted near the area (if possible).

2. If the spill is of toxic or hazardous materials, it should be reported immediately to 911 and/or the Kirtland AFB Fire Department and/or the Kirtland AFB Command Post (phone #(505) 846-3777).

3. As soon as practicable report spill to the Kirtland AFB Environmental Compliance Office.

4. Identify the source of the spill (if possible) and stop the flow of pollutants if it can be done in a safe manner as described above.

5. Record pertinent facts and information about the spill on the Kirtland AFB Spill Form contained in the Kirtland AFB Spill Plan (Appendix A of that document) (September 2000). The types of information recorded should include the following:

    - Type of pollutant
    - Location
    - Apparent source
    - Estimated volume
    - Time of discovery

6. Immediately dispatch appropriate equipment (e.g., front-end loader) to the spill and construct a berm or berms downstream of it to minimize the spread.
7. As soon as possible, during the spill response activities, the Kirtland AFB Environmental Compliance Office shall be notified and provided with the location, type, and amount of spilled material, and a briefing on the extent of the spread and potential for control.
8. Outside emergency response resources may or may not be mobilized, depending on the nature of the spill.
9. Cleanup should commence when the lateral spread has been contained and the notifications have been made.
10. Free liquid should be bailed or pumped into vacuum trucks or transport trucks.
11. When all liquid has been removed to the extent practicable to the soil layer, absorbent pads, sawdust, or floor dry should be applied to the surface and transferred to 55-gallon drums when they have soaked up as much as they can.
12. The remaining contaminated soils should be excavated and transported to an appropriate site that has been approved by the Kirtland AFB Environmental Compliance Office as soon as possible.
13. If contaminated soil is transferred to a temporary contaminant stockpile, it should be underlain with at least two layers of 10-mil polyethylene film. The edges should be bermed underneath the polyethylene film to provide a dam to prevent inflow of water or leakage of the liquid.

3.4.3 Spill Response Contacts

Kirtland AFB Fire Department	911
Kirtland AFB Environmental Compliance Office	Mr. Patrick Montaño (505) 846-8577
Kirtland AFB Command Post	(505) 846-3777
City of Albuquerque Fire Department	911
City of Albuquerque Police Department	911
National Response Center	(800) 424-8802

The National Response Center is to be contacted when a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117 or 40 CFR 302, occurs during a 24-hour period. The Kirtland AFB Environmental Compliance Office should be contacted if there is any question as to whether a spill or release is considered a reportable quantity and/or if a report to the National Response Center is going to be made.

3.5 Other Controls

3.5.1 Employee Training

Kirtland AFB shall ensure that all appropriate military and civilian personnel, contractors, and subcontractors are aware of the SWPPP requirements and the measures with which they need to comply.

3.5.2 Road Maintenance

Heavy equipment and vehicle traffic will be limited as much as possible to existing roads, or designated new roads, to minimize areas of new disturbances.

3.5.3 Maintenance

All erosion and sediment control measures and other protection measures will be maintained in effective operating condition. Maintenance will be performed on an "as-needed" basis.

3.6 Measures to Protect Endangered Species, Critical Habitat, or Historic Places

As indicated in Section 2.9, the potential impacts construction projects may have on endangered or threatened species of concern in each project area will be evaluated as part of the base NEPA process by the Natural Resources Office of Kirtland AFB. If the Natural Resources Office evaluation indicates that endangered or threatened species are present or are likely to be present in a given construction area, the contractor will be informed of any special conditions, requirements, and restrictions that will be necessary to protect the species of concern. Additional site inspections by Natural Resources Office staff before, during, and after construction activities may be conducted to ensure protection of the species of concern.

The potential impacts construction projects may have on historic properties or culturally significant sites in each project area also will be evaluated as part of the base NEPA process by the Kirtland AFB Environmental Compliance Office. If a site(s) are identified, appropriate requirements to meet eligibility under the permit and to protect the historic site will be provided to the contractor by the Environmental Compliance Office.

TABLE 3-3
Materials Handling Control Measures That May Be Implemented At Construction Sites

Kirtland AFB SWPPP

Control Measure	Description of Control Measure
Good housekeeping	General good housekeeping should be conducted at all times at the construction site. The project area should be kept free, as much as practicable, from trash, spilled fuels or oils, and miscellaneous construction debris
Provision of trash receptacles	Trash receptacles (i.e dumpsters or garbage cans) should be provided for daily domestic-type trash and garbage. Receptacles should be sturdy and placed in areas where they will not be knocked or blown over. Receptacles should be emptied on a regular basis.
Trash removal	Domestic type garbage from trash receptacles, construction or materials packaging, and other general trash and debris should be removed from the site on a regular basis
Material Safety Data Sheets (MSDSs)	MSDSs for substances used or stored on the construction site will be available for review and use
Materials inventory	Materials stored onsite shall be inventoried. Additional materials brought onsite will be recorded.

3.4 Spill Prevention, Control, and Response Practices

The following basic spill prevention, control, and response plan shall be implemented as part of the Construction Storm Water Permit SWPPP for construction activities at Kirtland AFB. This basic spill prevention and response plan in not intended to suffice for or replace spill plans required by other regulations.

Spill prevention, control, and response actions may vary for each construction site at Kirtland AFB. Any divergences from the below outlined plan for a specific site, activity, or project will be submitted to the Environmental Compliance Office as *Attachment 6* of the *Project Compliance Documentation* package.

3.4.1 Spill Prevention

- The types and quantities of toxic materials at a construction site should be minimized to the extent practicable. If significant quantities of a certain toxic materials or other pollutants do need to be used at a site, a specific procedure for material containment and spill prevention for that material and quantity should be developed and implemented. Such specific procedures should be submitted in *Attachment 6* of the *Project Compliance Documentation* package.

Section 4
Inspection Procedures

4.1 Inspection Requirements for Sites During Construction

4.1.1 Frequency

Consistent with the Construction Storm Water Permit, inspection during construction activities of the site will be performed at least once every 7 days or at least once every 14 days and within 24 hours of a precipitation event of 0.5 inches or greater that may result in surface erosion. The selected inspection schedule should be indicated in the *Project Compliance Documentation*. During seasonal dry periods in a semi-arid area such as Kirtland AFB (areas with an average annual rainfall of 10 to 20 inches), inspections may be reduced to no less than once every month. If the contractor for a specific site wishes to reduce the inspection frequency during seasonal arid periods, the Kirtland AFB Environmental Compliance Office must be contacted and verbally concur with the request to reduce the inspection frequency. A notation of the requested inspection reduction will be noted in the *Project Compliance Documentation* by Kirtland AFB Environmental Compliance Office staff. Following the first rainfall event after a dry period, the inspection frequency will be considered to automatically return to the originally selected inspection schedule.

4.1.2 Inspection Procedures

The contractor will be responsible for performing and documenting the site inspections at individual construction sites. Inspections shall consist of a review of the construction site perimeter, disturbed areas, and areas used for material storage that are exposed to precipitation. These areas will be reviewed for evidence of, or the potential for, pollutants entering the drainage system. The specific site controls and BMPs that were identified in the *Project Compliance Documentation* package will be inspected to ensure they are being implemented properly. An official record of inspections shall be kept at the construction site as part of the onsite *Project Compliance Documentation* and SWPPP. Each inspection report does not need to be submitted to the Kirtland AFB Environmental Compliance Office; however, inspection records must be available for review onsite if requested by the Office.

Each inspection will be recorded on a copy of the SWPPP Inspection Checklist (Appendix B). A copy of an area-specific map or site plan will accompany inspection checklists and be manually updated as necessary during the inspection to reflect any changes or additions in the following features:

- Construction site boundaries
- Areas of soil disturbance
- Areas that will not be disturbed
- Approximate slopes after major grading
- Areas of cut and fill

- Locations of major erosion control facilities or structures
- Locations where stabilization practices are expected to occur
- Springs, streams, wetlands, and other surface waters
- Storm water discharge locations

4.1.3 Responsibilities and SWPPP Updates

Inspections shall be the responsibility of and performed by the onsite operator of each individual construction site at Kirtland AFB. As necessary, the SWPPP will be revised to incorporate any changes that come about as the result of the inspection. The updated maps and the SWPPP Inspection Checklist will be maintained as records, consistent with the Construction Storm Water Permit. Changes that affect the description of pollutant sources or the pollutant prevention control measures will be made to the *Project Compliance Documentation* within 7 days of the inspection, as required by the Construction Storm Water Permit. These changes also will be submitted to the Kirtland AFB Environmental Compliance Office if significant changes from the original plan are made and/or when a number of smaller changes have been accumulated.

4.1.4 Storm Water BMP Maintenance Guidelines

Table 4-1 provides guidelines for inspecting BMPs to determine if they are functioning properly or need to be changed or maintained.

TABLE 4-1
Storm Water BMP Maintenance Guidelines

Kirtland AFB Construction SWPPP

SILT FENCE
Is the fence damaged, collapsed, un-entrenched or ineffective?
Has sediment been removed from behind fence?
Is the silt fence properly positioned?
STRAW BALE BARRIER
Are the straw bales damaged, ineffective or un-entrenched?
Has sediment been removed from behind bales?
Are the bales installed and positioned correctly?
EROSION CONTROL BLANKET
Is fabric damaged, loose or need repairs?
INLET PROTECTION
Is the inlet protection damaged, ineffective or need repairs?
Has sediment been removed?
EARTH DIKES/BERMS
Are dikes or berms in good condition, without gaps or damaged areas?
Are dikes or berms installed in areas of soil stockpiles?
CHECK DAM
Has accumulated sediment and debris been removed from behind dams?
Have materials removed been properly disposed of?

TABLE 4-1
Storm Water BMP Maintenance Guidelines

Kirtland AFB Construction SWPPP

SEDIMENT BASIN
Has sediment and debris been cleaned out of the basin?
Have materials removed been properly disposed of?
STREAM CROSSINGS
Are stream crossings installed where needed?
Are stream crossings in good condition and protective of watercourse?
TEMPORARY SWALES
Has any sediment or debris been deposited within the swales?
Have the slopes of the swale eroded or has damage occurred to the lining?
SURFACE ROUGHENING
Any vehicle tracks evident on roughened slopes?
Any evidence of erosion?
VEHICLE TRACKING AT ENTRANCE/EXITS
Is gravel surface clogged with mud or sediment?
Is the gravel surface sinking into the ground?
Has sediment been tracked onto public roads; has it been cleaned up?
PRESERVATION OF NATURAL VEGETATION
Is natural vegetation being preserved?
Are areas of natural vegetation appropriately protected or designated to avoid damage?
TEMPORARY SEEDING
Are the seedbeds protected by mulch?
Has any erosion occurred in the seeded area?
Any evidence of vehicle tracking on seeded areas?
PERMANENT SEEDING
Are the seedbeds protected by mulch?
Has any erosion occurred in the seeded area?
Any evidence of vehicle tracking on seeded areas?
SOD STABILIZATION
Is sod properly installed?
Are there gaps or areas of exposed soil between sod sheets?
Is sod stressed or dead?
MULCHING
Distributed uniformly on all disturbed areas?
Any evidence of mulch being blown or washed away?
Has the mulched area been seeded?
VEGETATIVE BUFFER STRIPS
Are vegetative buffer strips installed or maintained?
Are areas of vegetative buffer strips appropriately protected or designated to avoid damage?
Are vegetative buffer strips covered or filled with debris or sediment?

TABLE 4-1
Storm Water BMP Maintenance Guidelines

Kirtland AFB Construction SWPPP

FURROW CONTOURING
Is furrow contouring implemented on final slopes, as practicable?
Is erosion visible cross-cutting furrow contours?
GEOTEXTILES
Is fabric damaged, loose or need repairs?

4.2 Inspection Requirements Prior to Final Stabilization

Inspections may be reduced to once every month after construction activities are complete, but before final stabilization (i.e., vegetative cover, if appropriate) has been fully established. Final stabilization is considered paving areas, establishing a perennial vegetative cover, or establishing other equivalent permanent stabilization measures such as the use of rip rap or geotextiles.

Record of the monthly inspections shall be kept by the contractor that is the operator of the individual site as well as submitted to the Kirtland AFB Environmental Compliance Office. The construction areas that require revegetation will be considered reclaimed and finally stabilized when the disturbed areas have been 70 percent revegetated to the pre-existing vegetative cover with perennial native and/or otherwise appropriate vegetation. After final stabilization and reclamation has been completed inspections will no longer be required.

Section 5
Recordkeeping

5.1 Documents and Accessibility

A standing NOI will be submitted by Kirtland AFB to apply for coverage under the Construction Storm Water Permit as an operator with operational control over construction plans and specifications. This NOI will be maintained at the Kirtland AFB Environmental Compliance Office.

For individual construction projects at the base, a copy of this SWPPP, the project specific SWPPP (if applicable), the site specific *Project Compliance Documentation* package, the individual NOI the contractor submitted to the EPA as the operator with direct day-to-day control, and copies of inspection reports must be maintained during construction by the operator with day-to-day control of the site. These documents should be retained at the project site. If facilities where documentation can be kept are not available at the project site (i.e., an onsite office or construction trailer), the documentation may be maintained at another designated area. The location where project documentation will be maintained and available for review by regulatory personnel and/or Kirtland AFB personnel will be indicated in *Attachment 7* of the *Project Compliance Documentation* package submitted to the Kirtland AFB Environmental Compliance Office.

A sign also must be conspicuously posted at the entrance of the construction site or in a nearby area that includes a copy of the completed NOI submitted to the EPA by the day-to-day operator at the site. The sign must indicate the location of the SWPPP and the name and telephone number of a contact person to arrange for the SWPPP to be reviewed.

Section 6
SWPPP Coverage Termination

6.1 Notice of Termination

If at any time Kirtland AFB will no longer operate under this established SWPPP or continue to function as a site operator with operational control over construction plans and specifications a Notice of Termination (NOT) will be filed with the EPA. At that time, a replacement NOI, and SWPPP, as is required by regulations at the time, will be put into place to replace operation under this SWPPP.

6.2 Kirtland AFB Final Approval of Individual Construction Sites

Following completion of construction at each construction site and final stabilization of the site, as necessary, the contractor at the site will submit to the Kirtland AFB Environmental Compliance Office an internal *Kirtland AFB, Construction SWPPP, Project Close-Out Form*. At that time the Environmental Compliance Office will concur that the project is completed and ready for close-out and concur that the contractor no longer has day-to-day control of activities at the site and no longer has continued responsibility regarding storm water discharges related to construction activities at the site.

If final stabilization or reclamation of the site has not been completed as indicated in the *Project Compliance Documentation,* or measures have not been implemented correctly, or final site reclamation has not been conducted to the satisfaction of the Environmental Compliance Office staff, approval of the project close-out request may be withheld until the contractor has demonstrated compliance with required final stabilization and reclamation goals. Upon Kirtland AFB's final approval of a submitted *Kirtland AFB, Construction SWPPP, Project Close-Out Form,* the contractor will no longer be expected to conduct onsite inspections or maintenance of BMPs at the site. Submittal of the internal Kirtland AFB *Project Close-Out Form* does not constitute submittal of the appropriate NOT documentation to the EPA nor will Kirtland AFB submit any NOT documentation to the EPA on the contractor's behalf.

Upon completion of a project, the contractor for a construction site also will need to independently submit an appropriate NOT directly to the EPA to terminate their coverage under the Construction Storm Water Permit as the site operator with day-to-day control. A copy of the submitted EPA NOT form also should be submitted to the Kirtland AFB Environmental Compliance Office.

Kirtland AFB will retain its required documentation for each construction site for the required 3-year period following the final Kirtland AFB concurrence with site close-out. The contractor should retain their documentation as required by the regulations.

References

USAF, 2001. Installation Natural Resources Management Plan. Kirtland AFB Environmental Restoration. 2001.

USAF, 2000. Kirtland AFB Spill Plan. Kirtland AFB Environmental Restoration. September 2000.

USEPA, 2003. National Pollutant Discharge Elimination System General Permit for Discharges of Large and Small Construction Activities. Washington, DC. July 2003.

Appendix A
EPA NPDES Construction Storm Water General Permit

The full text of the EPA's 2002 NPDES General Permit for Storm Water Discharges From Construction Activities is not provided in each copy of the SWPPP. A full copy of the General Permit is included in the Kirtland AFB master SWPPP.

Additionally, a copy of the General Permit in .pdf format is included with the electronic SWPPP files on available CDs.

The General Permit can also be accessed via the internet at http://www.epa.gov/npdes/pubs/cgp2003_entirepermit.pdf.

Appendix B
SWPPP Inspection Checklist

SWPPP INSPECTION CHECKLIST

DATE:
INSPECTOR:

Consistent with the Construction Storm Water Permit, inspection during construction activities of the site will be performed at the selected schedule. The schedule may be (1) at least once every 7 days, or (2) at least once every 14 days and within 24 hours of a precipitation event of 0.5 inches or greater that may result in surface erosion. During seasonal arid periods in semi-arid areas such as Kirtland AFB (areas with an average annual rainfall of 10 to 20 inches), inspections may reduced to at least once every month, at the discretion of the Kirtland AFB Environmental Compliance Office. If the operator of a specific construction site wishes to reduce the inspection frequency during seasonal arid periods a reduction must be verbally authorized by the Kirtland AFB Environmental Compliance Office. Following the first rainfall event after an arid period, the inspection frequency will be considered to automatically return to the originally selected schedule.

Records of inspections must be available for review at the project site on a continual basis. Furthermore, on a quarterly basis copies of all inspection records from that period should be submitted to the Kirtland AFB Environmental Compliance.

This copy of the SWPPP inspection checklist should be reproduced and a new form should be used for each inspection.

OVERALL SITE INSPECTION PROCEDURES	YES	NO	N/A	COMMENTS/CORRECTIVE ACTION
Is there any evidence of sediment leaving the construction site? If so, note areas.	☐	☐	☐	
Have any adverse impacts such as flooding, structural damage, erosion, spillage, or accumulation of sediment, debris or litter occurred on adjacent property, wetlands or surface waters?	☐	☐	☐	
Have the Storm Water BMPs been placed as shown on drawings or plans? **SEE MAP 1B.**	☐	☐	☐	
Are the Storm Water BMPs functioning as intended?	☐	☐	☐	
Is work being done according to approved plans?	☐	☐	☐	

INSPECTOR'S SIGNATURE:	**DATE:**

Appendix C
Small Construction Low Rainfall Erosivity Waiver Project Calendar

The attached project calendar indicates those portions of the year during which the rainfall in the Kirtland AFB area is low enough that use of the RUSLE calculation will result in an erosivity factor of less than 5. During these periods small construction projects (greater than or equal to 1 acre but less than 5 acres) will qualify for the low rainfall erosivity waiver and the requirements of the Construction Storm Water General Permit may be waived for that project. This waiver option if not available to large construction projects (greater than 5 acres).

The attached project calendar (Figure C-1) is used by identifying the small construction project start and end dates within the calendar year. The row for the project start date shown in the leftmost column should be followed across to the block for the following week's period within the Calendar Year 1 portion of the table. Starting at that block the row should be followed across to the column corresponding to the week of the project end date as shown by the dates at the top of the calendar. To reach an end date that extends into a second calendar year the same row should be followed back to the leftmost side of the table and then through to the end date column in the Calendar Year 2 portion of the table. Project schedules that fall fully within the unshaded white areas of the calendar will qualify for the low rainfall erosivity waiver. If any portion of the project schedule will extend into the yellow shaded portions of the calendar the entire project will be subject to the requirements of the Construction Storm Water General Permit.

Examples:

The following examples demonstrate how the construction project calendar should be used to determine a small construction project's eligibility for the low rainfall erosivity waiver. Figure C-2 graphically illustrates how the project schedules would be placed on the project calendar.

1. For a project that starts during the week of April 1 and ends during the week of May 31 in the same calendar year the entire project will fall within the unshaded portion of the project calendar and therefore qualify for a low rainfall erosivity waiver.

2. For a project that starts during the week of April 16 and ends during the week of October 31 in the same calendar year a portion of the project will fall within the unshaded portion of the project calendar and a portion will fall within the shaded portion of the calendar where a permit is required. Therefore, this project would not qualify for a low rainfall erosivity waiver and would be subject to the requirements of the Construction Storm Water General Permit for the duration of the project.

3. For a project that starts during the week of November 1 and ends during the week of July 31 in the following calendar year the majority of the project will fall within the unshaded portion of the project calendar and a small portion will fall within the shaded portion of the calendar where a permit is required. Therefore, this project would not qualify for a low rainfall erosivity waiver and would be subject to the requirements of the Construction Storm Water General Permit. This will be the case even though the majority of the project would occur in the portion of the year when a low rainfall erosivity waiver was available. The extension into the non-low rainfall portion of the year eliminates the possibility of a waiver and permit coverage must be sought for the duration of the project.

Attachment 6

Seed Specifications for Revegetation

Curtis & Curtis Inc.

4500 N. Prince, Clovis NM 88101
Phone: 505-762-4759 Permit # TX 2772

Tall Fescue, Zanzibar

Lot #: 14974

Test Date: 1/06

Pure Seed	99.56%	Germination:	98.00%	Origin	Oregon
Inert	0.44%	Dormant:	0.00%	Net Wt:	50.00 lb
Other Crop	0.00%	Total Germination:	98.00%		
Weed Seed	0.00%				

Noxious Weeds: None

---

kind: KENTUCKY BLUEGRASS Var: V.N.S.

Lot: 01.130.86

pure:	98.37 %	Germ & Hard:	85 %
Crop:	.16 %	Germination:	85 %
Inert:	1.46 %	Hard/Dormant:	0 %
Weeds:	.01 %	Net. Wt:	5 #
		Tested:	02-02
Noxious Weeds: NONE FOUND		Origin:	ID

A V SEED SOLUTIONS-4625 COLO BLVD-DENVER CO 80216

APPENDIX C

Site Health and Safety Plan

1. SAFETY AND HEALTH REQUIREMENTS

This section provides the site-specific safety and health requirements for the planned construction services at the Golf Course Main Pond (GCMP) and five ancillary ponds. All field activities will be conducted in accordance with the Kirtland AFB Base-Wide Site Safety and Health Plan (USAF, 2004b) and the site-specific requirements described in this Work Plan.

1.1 Personal Protective Equipment

Although work proposed at GCMP and five smaller ponds is considered "clean construction," modified Level D personal protective equipment is required for the field activities. The work uniform will include steel-toed work shoes, safety glasses, reflective vests, and hard hats. Leather gloves should be worn during handling of tools and rocks.

1.2 Working around Bank Slopes

Construction activities near the bank slopes of the GCMP and five small ponds will require the site HSO to assess the work as it is performed to ensure that safe footing for equipment and personnel is implemented. Heavy equipment operators will not place their equipment in unsafe positions. A factor in the selection of the types of equipment to be used will include access. Personnel will not work directly on the bank slope, but on top of the bank, where footing may be hindered by the presence of the large river rocks. Personnel may be required to wear shoes with extra traction. Other techniques as determined by the HSO may be used to protect the site workers while they work on the bank and near the slopes.

Personnel working near the water may require additional protection to prevent drowning. As determined by the HSO in consultation with the Project Environmental and Safety Manager, personnel will wear personal flotation devices (life jackets), or will be tied to an anchor, such as a piton, driven into the work space surrounding the pond.

1.3 Heavy Equipment Safety

Because heavy equipment may present diverse hazards, the following practices shall be observed:

- Suppliers and subcontractors shall provide equipment that meets the requirements of all relevant Occupational Safety and Health Administration standards.
- The HSO and the operator shall inspect equipment upon receipt of the equipment and before use. At a minimum, guarding, hydraulics, hoisting, rigging, backup alarms, and the overall condition shall be reviewed and any deficiencies corrected before use.
- The qualifications of the operator shall be verified before work is initiated.
- All equipment shall have seat belts and rollover protection.
- All equipment shall have operational backup alarms and a fire extinguisher.
- Copies of any pertinent inspections shall be provided to the HSO before the start of work.
- Prior to use, all equipment shall be inspected daily using the equipment inspection checklist.

1.4 Emergency Contacts

Emergency contact numbers will be conspicuously posted onsite in a location easily accessible by all personnel. Additional emergency telephone numbers are shown in Table C-1.

Table C-1. Emergency Telephone Numbers

Contact	Number
Roger Margotto, Project Environmental and Safety Manager 24-Cell Phone	(619) 471-3503 (619) 988-0520
Rod Reese, Construction Superintendent/HSO	(916) 996-4507 (mobile)
Pam Moss, Project Manager	(303) 980-3519 (303) 810-1223 (mobile)
Jim Martell, USACE Project Manager	(918) 663-7171
Rob Warder, Kirtland AFB	(505) 853-0012
Mark Apadaca, Golf Course Manager	(505) 846-6311
Kirtland AFB Security	(505) 846-7926
Kirtland AFB Command Post (24-hour emergency contact)	(505) 846-6432
Medical Consultant, Dr. Greaney (non-emergency contact)	(800) 455-6155

AFB Air Force Base
HSO Health and Safety Officer
USACE United States Army Corps of Engineers

1.5 Activity Hazard Analysis

An activity hazard analysis (AHA) was prepared in accordance with the Base-Wide SHSP (Attachment 1). The AHA summarizes the planned project activities, anticipated hazards associated with those activities, and the means used to control the hazards. The AHA will be reviewed and updated, if necessary, prior to the beginning of each work activity or when work specifications or scope change.

Attachment 1 – Activity Hazard Analysis

Activity	Potential Hazard	Protective Measures and Controls
Heavy equipment activities (hauling, placement)	Struck by equipment	Use spotters when backing up heavy equipment and maintain eye contact with personnel in the immediate work area. Ground crew wears safety vests to increase visibility.
	Uneven or slippery terrain: slips/trips/falls	Ensure that work area is kept cleared of debris and unnecessary equipment, identify depressions or mounds on work surfaces, and inspect work area daily to identify hazards.
	Cuts, pinches, and smashes	Personnel will be required to wear hard hats, steel-toed boots, and safety glasses, and keep appropriate distance from equipment until load has been offloaded.
40-mil high-density polyethylene (HDPE) liner rolling, cutting and welding	Cuts, pinches, and smashes	Cut-resistant work gloves will be worn when handling sharp objects. All hand tools will be maintained in safe condition. Guards will be kept on while using all power tools. Avoid pinch points. Hands shall be kept clear of moving parts. Cut away from, never toward, the body. Blade cutters will always be closed when not in use and never placed in employee's pockets.
	Manual lifting of heavy items: personal injury or strain	Site personnel will be instructed on proper lifting techniques. Mechanical devices should be used to reduce manual lifting of material. Team lifting should be utilized if mechanical devices are not available.
	Rolling-out liner/walking on liner: personal injury	Never work beneath a liner as it is unrolled on a slope. Wear shoes with good traction (may need to wear athletic shoes rather than steel toe boots).
	Hot surfaces on equipment (welding tool)	Ensure guards are in place. Ensure personnel are properly trained on equipment.
Work on bank slopes	Steep terrain, loose rocks, uneven terrain: slips/trips/falls, equipment instability	Ensure site workers are aware of hazards; use experienced equipment operators with knowledge of surroundings; use spotters when necessary.
	Work near slopes; slippery liner may cause workers to fall into water	Tie-off workers to support, such as piton-like anchors or heavy machinery that has been locked and tagged out, when working near water edge. Alternatively, a personal flotation device may be worn while working near water. If personnel are tethered, a personal flotation device shall be available for use as necessary in the event the tether breaks. Wear slip-resistant work boots with good traction. Athletic-type shoes may be better to wear when working with the liner material. (Note: Spikes are not permitted on any new liner material or liner material that is not going to be repaired.)

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ATTACHMENT D

Waste Management Plan

WASTE MANAGEMENT PLAN

Tetra Tech will conduct waste management activities for waste vegetation from clearing and grubbing operations, waste (non-usable) riprap, waste liner material, and excavated waste soil from re-grading. The amount of generated wastes from this project will be minimized. The anticipated volume is a maximum of 2 ft of saturated soil over the five existing smaller pond surfaces in conjunction with the clearing and grubbing of the vegetation, and waste riprap from the GCMP. Non-degradable waste materials (rock and soil) will be recycled to the greatest extent practical.

A viable, cost-effective alternative to off-site disposal is the use of onsite landfill LF-268. Anticipated onsite disposal materials include waste soil, geomembrane, vegetation, and rock. Hazardous materials or waste characterization is not expected.

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