

SURFACE-WATER MANAGEMENT AND EROSION CONTROL PLAN

ON-SITE DISPOSAL FACILITY

**Revision 2B
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20100-PL-004**

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**Fernald Environmental Management Project
Fernald, Ohio**

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Under

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Contract 95PS005028**

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REVISION SUMMARY

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1	8/01	Issuance of Revision 1 to incorporate lessons learned and design change notices from OSDF Phase I and II.
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FEMP OSDF-SWMECP
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**SURFACE-WATER MANAGEMENT AND EROSION CONTROL
PLAN**

**ON-SITE DISPOSAL FACILITY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

**REVISION 2B
January 2002
20100-PL-004**

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ACRONYM LIST

- ARAR Applicable or Relevant and Appropriate Requirement
- BAMR Borrow Area Management and Restoration
- CFR Code of Federal Regulations
- CQA Construction Quality Assurance
- DCP Design Criteria Package
- DOE United States Department of Energy
- EPLTS Enhanced Permanent Leachate Transmission System
- FEMP Fernald Environmental Management Project
- IMP Impacted Material Placement
- LCS Leachate Collection System
- LTS Leachate Transmission System
- NPDES National Pollutant Discharge Elimination System
- OAC Ohio Administrative Code
- OEPA Ohio Environmental Protection Agency
- ODNR Ohio Department of Natural Resources
- OSDF On-Site Disposal Facility
- OU2 Operable Unit 2
- OU5 Operable Unit 5
- PCCI Post-Closure Care and Inspection
- ROD Record of Decision
- SWMEC Surface-Water Management and Erosion Control
- TBC To Be Considered Criteria
- USDA United States Department of Agriculture

1.0 INTRODUCTION

1.1 Overview

This Surface-Water Management and Erosion Control (SWMEC) Plan describes the surface-water management and erosion control practices to be followed within the battery limit of the Fernald Environmental Management Project (FEMP) On-Site Disposal Facility (OSDF), Fernald, Ohio. The guidance provided in this document applies to the use of engineered features designed to manage surface-water, minimize erosion, and control off-site sedimentation.

This SWMEC Plan (Plan) addresses surface-water management and erosion control practices throughout the construction, impacted material placement, and closure of the OSDF and the development and restoration of the borrow area. This plan does not address surface-water management and erosion control practices during or beyond the 30-year post-closure period prescribed in the "*Final Record of Decision for Remedial Actions at Operable Unit 2*" (OU2 ROD) [DOE, 1995a]. Those activities are addressed in the "*OSDF Post-Closure Care and Inspection (PCCI) Plan*" [FEMP, 1997].

1.2 Project Description

The construction and closure of the OSDF, impacted material placement, and the development and restoration of the borrow area began in 1997 and is currently in progress. Due to the potential for variations in the pace of remedial action activities, the OSDF has been designed to be constructed, have impacted material placed, and subsequently closed, in phases.

The design approach for the OSDF is presented in the document, "*Final Remedial Design Work Plan for Remedial Actions at Operable Unit 2*" [DOE, 1995b]. The currently approved design of the OSDF is presented in the "*Final Design Package, On-Site Disposal Facility*" [GeoSyntec, 1997]. The "*Design Criteria Package, On-Site Disposal Facility*" (DCP) [GeoSyntec, 2000c] for the OSDF requires preparation of a SWMEC Plan to address the work scope identified in Section 1.3 of this plan. This

SWMEC Plan also satisfies the applicable requirements identified in Section 2.0 of this plan.

1.3 SWMEC Plan Scope

This SWMEC Plan establishes the surface-water management and erosion and sediment control practices that the Contractor will follow to maintain the proper performance of the OSDF, and to minimize impacts to surrounding areas and surface-water conveyances from excessive sediment loading. The requirements for surface-water management and erosion controls are specified in the Technical Specifications. The scope of this SWMEC Plan includes a description of engineered features that will handle:

- surface-water runoff from outside the battery limit to inside the OSDF battery limit;
- surface-water runoff from areas within the battery limit that will be discharged through the temporary and permanent surface-water management system of the OSDF; and
- wastewater, which includes waters that must be contained, collected, and treated.

Wastewater generated as a result of development of the OSDF area includes:

- leachate from impacted material within each cell of the OSDF; leachate is defined as surface-water that percolates into the leachate collection system (LCS), and will be discharged to the OSDF Enhanced Permanent Leachate Transmission System (EPLTS);
- impacted surface-water runoff retained within the OSDF cells; these wastewaters may be pumped to the FEMP former production area storm drainage control system or the EPLTS;

- surface-water runoff from impacted-material staging areas within the OSDF battery limits; these wastewaters will be contained, collected, and discharged to the FEMP former production area storm drainage control system;
- washwater from the equipment wash and the wheel wash facilities; these wastewaters will be contained, collected, and discharged to the FEMP former production area storm drainage control system;
- surface-water runoff from impacted-material haul roads within the OSDF battery limits; these wastewaters will be contained, collected, and discharged to the FEMP former production area storm drainage control system;
- perched groundwater that seeps into excavations from areas with impacted soil; these wastewaters will be contained, collected, and transferred to the FEMP former production area storm drainage control system.

The engineered features of the surface-water management and erosion control system are described in Sections 4.0, 5.0, and 6.0 of this plan, on the Construction Drawings, and in the Technical Specifications.

1.4 SWMEC Plan Organization

The remainder of this SWMEC Plan is organized as follows.

- A description of other plans related to this SWMEC Plan is presented in the remainder of Section 1.0.
- The requirements from the DCP applicable to this SWMEC Plan are described in Section 2.0.
- General information regarding the development of the OSDF and borrow area as they relate to this SWMEC Plan is presented in Section 3.0.
- Stabilization features are described in Section 4.0.

- Surface-water runoff/runoff control structures are described in Section 5.0.
- Sediment control structures are described in Section 6.0.
- Requirements for inspection and corrective action are described in Section 7.0.
- References are presented in Section 8.0.

1.5 **Related Plans**

Several other support plans and reports have been prepared for the OSDF remedial action project and should be used by the Contractor in conjunction with this SWMEC Plan. The other plans and reports containing information relevant to this SWMEC Plan are listed below with a brief statement of their relationship to this plan. The Contractor will refer to the latest revisions of plans and reports listed below.

- *"Storm Water Pollution Prevention Plan"* [FDF, 1999b]. The Storm Water Pollution Prevention Plan is a condition of the FEMP site National Pollutant Discharge Elimination System [NPDES] permit.
- *"Permitting Plan and Substantive Requirements for the OSDF"* [FDF, 1997a]. The Permitting Plan and Substantive Requirements for the OSDF report identifies and addresses permitting requirements.
- *"Remedial Action Work Plan for the OSDF"* [FDF, 1999a]. The Remedial Action Work Plan identifies the implementation strategy and preliminary schedule for completion of construction of the OSDF, placement of impacted materials, and long-term maintenance and monitoring of the OSDF.
- *"Final Design Package, On-Site Disposal Facility"* [GeoSyntec, 1997]. The Final Design Package provides calculations, drawings, and specifications for the currently approved design of the OSDF.

- *"Borrow Area Management and Restoration (BAMR) Plan, On-Site Disposal Facility"* [GeoSyntec, 2000a2001a]. The BAMR Plan contains procedures that the Contractor will use to develop, manage, and restore the on-site borrow area.
- *"Construction Quality Assurance (CQA) Plan, On-Site Disposal Facility"* [GeoSyntec, 2000b]. The CQA Plan contains procedures to evaluate and monitor soils compaction and other construction activities of the OSDF project.
- *"Systems Plan"* [FDF, 1997b]. The Systems Plan contains procedures that the Contractor will use to inspect and maintain the OSDF during construction, impacted material placement, and closure.
- *"Impacted Materials Placement (IMP) Plan, On-Site Disposal Facility"* [GeoSyntec, 2000d]. The IMP Plan contains procedures that the Contractor will use to place impacted materials into the OSDF.
- *"Leachate Management Contingency Plan for the OSDF"* [DOE, 1998]. The Leachate Management Contingency Plan for the OSDF identifies and addresses leachate management during the period when the leachate transmission system (LTS) is not operational.
- *"OSDF Post-Closure Care and Inspection (PCCI) Plan"* [FEMP, 1997]. The PCCI Plan contains requirements for inspection and maintenance of the surface-water management and erosion controls during the post-closure period.

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2.0 REGULATORY AND OTHER APPLICABLE REQUIREMENTS**2.1 Overview**

Regulatory and other requirements applicable to this SWMEC Plan are contained in the DCP [GeoSyntec, 2000c1b]. These requirements take the form of applicable or relevant and appropriate requirements (ARARs) and to be considered criteria (TBCs) as determined by the Record of Decision for each of the various FEMP operable units, functional requirements, and general design criteria. The following requirements applicable to the SWMEC Plan were obtained from the DCP.

2.2 Applicable or Relevant and Appropriate Requirements

General ARARs that will be addressed by the Contractor are provided here.

No.	Title	Requirement
1.	Waste Storage Piles OAC 3745-56-51, 54 & 58, and 40 CFR §264.251 through .259	Collection and holding facilities associated with a runoff and runoff control system must be inspected weekly and be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.
2.	Ohio Solid Waste Disposal Regulations OAC 3745-27-19(E)(26)	The integrity of the engineered components of the landfill facility shall be maintained and any damage to, or failure of, the components shall be repaired.
3.	Ohio Solid Waste Disposal Regulations OAC 3745-27-19(J)(1), (4)	Surface water shall be diverted from areas where solid waste is being, or has been, deposited. The facility shall be designed, constructed, maintained, and provided with surface water control structures, as necessary, to control runoff and runoff of surface water to ensure minimal infiltration of water

No.	Title	Requirement
		through the cover material and cap system, and minimal erosion of the cover material and cap system. If ponding or erosion occurs on areas of the landfill facility where solid waste is being, or has been, deposited, action will be taken to correct the conditions causing the ponding or erosion.
4.	Ohio Solid Waste Disposal Regulations OAC 3745-27-11(H)	At final closure of a landfill facility, all land surfaces shall be graded to prevent ponding of water where solid waste has been placed. Drainage facilities shall be provided to direct surface water from the landfill facility.
5.	Ohio Solid Waste Disposal Regulations OAC 3745-27-11(O)	Closure of the sanitary landfill facility must be completed in a manner that minimizes the need for further maintenance and minimizes post-closure formation and release of leachate and explosive gases to surface water to the extent necessary to protect human health and the environment.

2.3 Functional Requirements

The DCP contains functional requirements that have been established for the OSDF. The functional requirements which are applicable to this SWMEC Plan, and which the Contractor will meet are:

- route surface-water to designated locations where it can be appropriately managed;
- protect the OSDF from damage caused by precipitation and surface-water runoff and runoff; and
- discharge surface-water to existing watercourses in accordance with applicable regulatory and Department of Energy (DOE) requirements.

The Contractor will develop a Contractor's SWMEC Work Plan (work plan) that provides details regarding implementation of surface-water management and erosion control measures that satisfies the requirements of the DCP, the Construction Drawings, the Technical Specifications, and this SWMEC Plan. The Contractor's SWMEC Work Plan will address temporary conditions during construction and closure of the OSDF, impacted material placement, and development and restoration of the borrow area. The work plan will identify specific activities which will prevent surface-water runoff to the OSDF and uncontrolled surface-water and impacted runoff from the OSDF. Features of the permanent surface-water management system will be constructed to require minimal monitoring and maintenance. The system will be integrated, to the extent possible, with existing topography, features, and facilities.

2.4 Design Criteria

The DCP also identifies a number of design criteria for the OSDF. The applicable design criteria to manage surface-water and control erosion are:

- temporary surface-water control structures for the OSDF and permanent surface-water control structures downgradient of the OSDF will be designed for the 25-year, 24-hour storm event [ARARs: 40 CFR §258.26 and OAC 3745-27-08(C)(6)(a) and (b)];
- temporary surface-water and erosion control structures will be designed in accordance with the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation document entitled "Rainwater and Land Development (ODNR 1996)."
- temporary surface-water control structures will be designed to minimize silting and scouring [ARAR: OAC 3745-27-08(C)(6)(c)];
- temporary sedimentation ponds or basins, if used, will be designed following the criteria of OEPA [ARAR: OAC 3745-27-08(C)(6)(d)]; and

- permanent surface-water runoff/runoff control structures for the OSDF will be designed to limit interruption and damage (i.e., washout) of the OSDF in the 2,000-year, 24-hour storm event; surface-water runoff should be controlled and diverted away from and around the OSDF using drainage channels or diversion berms.

Sedimentation basins and excavations containing water may pose a drowning risk to personnel. The Contractor will provide for ring buoys around bodies of water in accordance with OSHA 1926.106.

2.5 Other Requirements

In addition to the requirements contained in the DCP, the Contractor will incorporate the following additional requirements into the Contractor's SWMEC Work Plan to manage surface-water and control erosion:

- disturbed areas will be stabilized in accordance with the Technical Specifications;
- general practices for construction, inspection, and maintenance of surface-water management and erosion control features will be in accordance with the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation document entitled "*Rainwater and Land Development*" [ODNR, 1996]; and
- temporary sedimentation basins will be cleaned out to the design capacity when the sediment retained in the basin has reduced one-half of the basin's original storage depth [ODNR, 1996], but at a minimum of once yearly.

3.0 OSDF AND BORROW AREA DEVELOPMENT RELATED TO SURFACE-WATER MANAGEMENT AND EROSION CONTROL

3.1 Introduction

The OSDF will be developed in phases. Each phase may consist of the construction of cells, placement of impacted material in the cells, and closure of the cells. This plan describes surface-water management and erosion control practices for the following periods:

- preconstruction;
- cell construction;
- impacted material placement; and
- closure.

Surface-water management and erosion control measures within the cells, impacted material transfer areas, and impacted material haul roads will be maintained in accordance with the IMP plan during impacted material placement and winter shutdown. Surface-water management and erosion control is anticipated to be maintained throughout the OSDF post-closure period; however, as stated previously in Section 1.0 of this plan, post-closure activities are outside the scope of this plan and are addressed in the PCCI Plan.

A description is presented of the surface-water management and erosion control measures needed for each of the aforementioned development periods. The construction, inspection, and maintenance activities for the surface-water management and erosion control features are also presented in the remaining sections of this plan.

3.2 Preconstruction Period

The preconstruction period is defined as the period of time prior to the cell construction period. During the preconstruction period, disturbed areas will be kept to a minimum. The first step in minimizing soil erosion and sedimentation is the establishment of stabilization measures. The following stabilization measures will be implemented during the preconstruction period:

- in disturbed areas where additional grading or reworking is necessary prior to reaching final grade and is not scheduled for more than 45 days, interim vegetation will be applied to exposed soils to stabilize the soil and control erosion;
- where additional grading or reworking is not scheduled for a year or more, disturbed areas will be permanently seeded and mulched as soon as possible to stabilize soil and control erosion;
- in disturbed areas, crusting agents may be applied prior to interim or permanent vegetation with the approval of the Construction Manager;
- in areas indicated on the Construction Drawings, erosion mats will be installed following seeding; and
- riprap will be placed as indicated on the Construction Drawings within and along watercourses to prevent soil erosion under the design flow conditions.

Surface-water runoff/runoff control structures will be established to minimize erosion and off-site sedimentation. These structures will also be used to divert surface-water away from impacted areas, thus maintaining separation between non-impacted surface-water and potentially impacted surface-water. Surface-water runoff to areas under construction will be prevented by constructing diversions and drainage channels to route surface-water away from the disturbed areas and to drainage channels, to the extent feasible. The location of these features will be selected by the Contractor based on the sequence of construction activities and in accordance with the Contractor's SWMEC Work Plan.

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The following surface-water runoff/runoff and sediment control structures may be used during the preconstruction period:

- temporary sedimentation basins;
- temporary drainage channels;
- check dams;
- temporary diversions;
- silt fence; and
- culverts.

Surface-water runoff from undisturbed areas will be diverted from disturbed areas using temporary drainage channels, culverts, and temporary diversions. Surface-water runoff from disturbed areas will be diverted to a temporary sedimentation basin using temporary drainage channels, culverts, and temporary diversions.

3.3 Cell Construction Period

The cell construction period includes the excavation and construction of the OSDF cells and the excavation of the borrow area, including the construction and winter shutdown periods. The surface-water management and erosion control measures used during this period will be the same as those used for the preconstruction period. The location of these features will be selected by the Contractor based on the sequence of construction activities, in accordance with the Contractor's SWMEC Work Plan and as shown on the Construction Drawings and specified in the Technical Specifications.

Wastewater encountered during the cell construction period will be limited to perched groundwater from impacted areas. Perched groundwater that enters excavations from impacted areas will be collected in a toe drain, or other suitable sump,

and pumped or otherwise transferred to the FEMP former production area storm drainage control system.

3.4 **Impacted Material Placement Period**

The impacted material placement period includes the period during placement of impacted material in the OSDF cells, impacted material shut-down during the construction period, and winter shutdown. Impacted material placement will be in accordance with the Technical Specifications and the Contractor's IMP Work Plan. Measures to manage surface-water and control erosion and off-site sedimentation will be similar to those features used during the construction of the OSDF. The locations of these features will be selected by the Contractor based on the sequence of construction activities and in accordance with the Contractor's IMP Work Plan and as shown on the Construction Drawings and specified in the Technical Specifications.

In addition to these features, the leachate management system will be employed to contain leachate and impacted surface-water runoff within the cells of the OSDF. If these wastewaters percolate into the LCS, they will be discharged to the EPLTS. Specifically, wastewaters that will be encountered in the cell during impacted material placement should be managed as follows.

- *Leachate:* Precipitation or other water that falls into an active (i.e., in the process of having impacted material placed in accordance with the IMP Plan) OSDF cell and percolates into the LCS will be considered leachate and will be discharged to the EPLTS.
- *Impacted Surface-Water Runoff in Cells:* Placement of impacted material in OSDF cells will be performed such that surface-water runoff from active and open portions of a cell can be managed within the cell. Surface-water runoff from the impacted material retained within the Impacted Runoff Catchment Areas may be conveyed to the FEMP former production area storm drainage control system or the EPLTS.

- *Impacted Surface-Water Runoff from Impacted Material Transfer Areas, Haul Road, and Washwater from the Equipment and Wheel Wash Facilities:* Surface-water runoff from impacted material transfer areas should drain to sumps or impacted runoff sediment control structures and will be discharged to the FEMP former production area storm drainage control system. Surface-water runoff from impacted material haul roads within the battery limit will be contained and directed to the FEMP former production area storm drainage control system. Washwater from the Equipment and Wheel Wash Facilities will drain to a sump and will be discharged to the FEMP former production area storm drainage control system.

3.5 Closure Period

The closure period includes construction of the OSDF final cover system and the interim and final restoration of the borrow area. Features of the final cover system that may discharge surface-water to the permanent drainage structures include the contouring layer drainage layer, and final cover surface.

Surface-water runoff from impacted material will be diverted to the Impacted Runoff Catchment Area of the adjacent down-gradient cell. ~~For areas with a contouring layer of non-impacted material, surface-water runoff from the compacted clay cap will be diverted to the Impacted Runoff Catchment Area of the adjacent down-gradient cell until two lifts of compacted clay cap are placed in that area, after which surface-water runoff from the compacted clay cap will be diverted to permanent drainage channels as shown on the Construction Drawings and specified in the Technical Specifications. For areas with a contouring layer of impacted material, surface-water runoff from the compacted clay cap will be diverted to the Impacted Runoff Catchment Area of the adjacent down-gradient cell until four lifts of compacted clay cap are placed in that area, after which surface-water runoff from that area will be diverted to permanent drainage channels as shown on the Construction Drawings and specified in the Technical Specifications.~~ Impacted surface-water runoff will be prevented from discharging to areas where non-impacted final cover system components are placed.

During construction of the final cover system and interim and final restoration of the borrow area, the surface-water management and erosion control measures used during the cell construction period will remain in place to the extent possible. The permanent drainage channels, which are located at the perimeter of the OSDF, are shown on the Construction Drawings.

3.6 Post-Closure Period

As stated previously in Section 1.0, this SWMEC Plan does not address surface-water management and erosion control practices during or beyond the post-closure period as they are outside the scope of this plan; those activities are addressed in the PCCI Plan.

4.0 REQUIREMENTS FOR STABILIZATION FEATURES

4.1 Introduction

A description of the general requirements for construction, inspection, and maintenance of the stabilization features for both temporary and long-term conditions are presented in this section. These features include:

- interim vegetation;
- crusting agents;
- permanent vegetation;
- erosion mat; and
- riprap.

The construction, inspection, and maintenance of these stabilization features will be based on standard engineering and soil conservation practices. The methods presented in this section are taken from ODNR [1996]. Other methods of erosion and sediment control shall be implemented as approved by the Construction Manager.

4.2 Interim Vegetation

4.2.1 Definition

Interim vegetation is a stabilization measure that serves to hold soil in place until permanent vegetation is provided at the time of final grading. Interim vegetation will be applied to disturbed areas not receiving crusting agents which are scheduled to be ~~disturbed again within two years in the future.~~ Interim vegetation includes fertilizing, seeding, and mulching. Interim vegetation establishes a temporary vegetative cover on disturbed areas by seeding with the appropriate rapid growing vegetation. Mulching involves the application of plant residues and other suitable materials to the soil surface

and protects the soil surface against rain, wind, and sun while seeds are germinating and helps to ensure a fully established vegetative stand. Because the potential for erosion in disturbed areas is high until interim vegetation becomes established, it is essential for the Contractor to preserve the integrity of earthen structures used to control sediment, such as temporary diversions and sedimentation basins during interim vegetation.

4.2.2 Purpose

The Contractor will apply interim vegetation to:

- reduce the erosion and sedimentation by stabilizing disturbed areas;
- reduce problems associated with mud or dust from bare soil surfaces during construction; and
- reduce sediment transport to downstream areas and improve the visual aspects of the construction area.

The Contractor will apply mulch to:

- inhibit erosion by protecting the soil surface from raindrop impact and reducing the velocity of overland flow; and
- foster the growth of vegetation by retaining available moisture and providing insulation against extreme heat and cold.

4.2.3 Application

The Contractor will fertilize, prepare the seedbed, and apply interim vegetation to soil surfaces in accordance with the Technical Specifications. Additional planning, considerations and design criteria will be in accordance with guidelines provided in ODNR [1996].

4.2.4 Maintenance

Maintenance of interim vegetation includes repairing eroded areas, revegetating when necessary, watering, and mowing (if applicable). The Contractor will revegetate areas that do not properly germinate or produce an acceptable vegetative stand, in accordance with the Technical Specifications. The cause of the failure will be ascertained and corrected by the Contractor before revegetation. Areas requiring revegetation will be prepared in the same manner as the original installation repaired or reseeded as necessary. Once established, a regular maintenance program will be performed until acceptance of the vegetation by the Construction Manager. Physical soil conditions in the area may be unfavorable and may require an alternative approach and/or type of stabilization such as application of crusting agents.

The Contractor will inspect applied mulch at a frequency described in Section 7.0 of this SWMEC Plan, to check for rill erosion or bare spots. Wherever eroded or bare areas are observed, the Contractor will apply additional mulch and revegetate as necessary to ensure a good vegetative cover. Inspection and maintenance of the interim vegetation is the responsibility of the Contractor until acceptance of the vegetation by the Construction Manager.

4.3 Crusting Agents

4.3.1 Definition

Crusting agents will be selected in accordance with the Technical Specifications and will be used only with the approval of the Construction Manager. Crusting agents serve to hold soil in place until interim or permanent vegetation can be applied, such as during the winter and summer seasons and for soil stockpiles.

4.3.2 Purpose

The Contractor will apply crusting agents to:

- inhibit erosion by protecting the soil surface from raindrop impact and overland flow; and
- provide dust suppression for exposed soils and exposed coal fired ash (fly ash).

4.3.3 Application

The Contractor may apply crusting agents as a temporary measure prior to applying interim or permanent vegetation, after approval by the Construction Manager. In each case, however, the crusting agent will be applied in accordance with the Technical Specifications.

4.3.4 Maintenance

The Contractor will inspect the applied crusting agent at a frequency described in Section 7.0 of this SWMEC Plan to check for rill erosion or bare spots. Wherever eroded or bare areas are observed, the Contractor will reapply the crusting agent. Inspections will take place until the area is significantly disturbed or interim or permanent vegetation is applied.

4.4 Permanent Vegetation

4.4.1 Definition

Permanent vegetation will be applied when an area has been brought to final grade and to disturbed areas which are not scheduled to be disturbed again for a period of at least two years. Permanent vegetation will include seeding and mulching.

4.4.2 Purpose

The Contractor will apply permanent vegetation to:

- reduce erosion and decrease sediment yield from overland flow;
- permanently stabilize disturbed areas where permanent, long-lived vegetation is needed to stabilize soil that is at final grade; and
- permanently stabilize drainage channels where concentrated flow occurs and riprap is not required per the Construction Drawings or the Technical Specifications.

4.4.3 Application

The Contractor will prepare the seedbed and apply permanent vegetation in accordance with the Technical Specifications.

4.4.4 Maintenance

Maintenance of permanent vegetation and mulching will be performed in the same manner as for interim vegetation, as described in Section 4.2.4.

4.5 Erosion Mat

4.5.1 Definition

Erosion mat is used to stabilize areas such as drainage channels and steep slopes where interim or permanent vegetation may be slow to become fully established, or where required per the Construction Drawings or the Technical Specifications.

4.5.2 Purpose

The Contractor will place erosion mat to:

- protect the soil surface from the erosive forces of concentrated flow; and

- stabilize slopes exhibiting erosion susceptibility.

4.5.3 Application

Erosion mats will be installed in accordance with the Technical Specifications. Additional criteria will be in accordance with guidelines provided in ODNR [1996].

4.5.4 Maintenance

The Contractor will inspect the erosion mats at a frequency described in Section 7.0 of this SWMEC Plan to identify washouts or breakage of the erosion mat, until vegetation is fully established. If during inspection vegetation is found to be deficient or absent in specific areas, the Contractor will reinstall erosion mat and revegetate. If washouts or breakage occur, the problem areas will be regraded, reseeded, and new mats will be installed.

4.6 Riprap

4.6.1 Definition

Riprap is an erosion-resistant ground cover consisting of large, loose, angular stone installed wherever conditions are such that soil may erode under design flow conditions in the area. These conditions may include high velocity water flows, channelized flows, etc. Typical uses of riprap may be at culvert inlets and outlets, within drainage channels, or at the toe of slopes.

4.6.2 Purpose

The Contractor will place riprap to:

- protect the soil surface from the erosive forces of concentrated flow;

- slow the velocity of concentrated flow while enhancing the potential for infiltration; and
- stabilize slopes exhibiting seepage problems and/or erosion susceptibility.

4.6.3 Application

The Contractor will place riprap in areas indicated on the Construction Drawings. These areas are indicated where the use of matting or seeding is not practical due to the potential for soil erosion. The soil erosion may be due to soil conditions at the soil-water interface, surface-water turbulence and/or surface-water velocity.

The Contractor will place riprap in accordance with the Technical Specifications. The size, thickness, and areal extent of the riprap to be placed is based on surface-water calculations performed to meet the requirements of Section 2.0 of this SWMEC Plan. The following minimum guidelines are from the DCP.

- Riprap used in areas where there is a transition in channel width or a transition of a slope (e.g., at toe of slope) will extend upstream and downstream of the transition a distance of five times the downstream channel depth; the minimum extension should be 15 feet.
- Riprap used at the inlet of temporary culverts will have a length of at least 2 culvert diameters and a width of at least 3 culvert diameters.
- Riprap used at the outlet of temporary culverts will have a minimum length, width, and average particle size diameter based on the calculated design peak flow velocities and design guidelines from USDA-SCS [1987].
- Riprap used at the outlet of permanent culverts will have a minimum width of three times the culvert pipe diameter and a minimum length, lining thickness, and average particle size diameter based on the calculated design peak flow velocities using Figure 2-3 of ODNR [1996].

- The minimum thickness of riprap lining will be two times average particle size diameter.
- Geotextile filter will be used to control piping and erosion beneath riprap as shown on the Construction Drawings. Geotextile filter will meet the requirements of the Technical Specifications.

Additional design criteria will be in accordance with guidelines provided in ODNR [1996] and the DCP.

4.6.4 Maintenance

Once riprap has been installed it should require little maintenance. The Contractor will inspect riprapped areas at a frequency described in Section 7.0 of this SWMEC Plan to determine if high flows have caused scour beneath the riprap or dislodged any of the stone. If corrective actions are needed, the Contractor will accomplish such repairs within the same work day.

4.7 Construction Entrance

4.7.1 General

Construction entrances will be constructed where shown on the Construction Drawings and in accordance with ODNR [1996].

4.7.2 Maintenance

The Contractor will inspect the construction entrances at a frequency described in Section 7.0 of this SWMEC Plan. The Contractor will perform maintenance in accordance with guidelines provided in ODNR [1996].

5.0 SURFACE-WATER RUNON/RUNOFF CONTROL STRUCTURES

5.1 Introduction

A description of the general requirements for construction, inspection, and maintenance of the surface-water runon/runoff control structures for both temporary and long-term conditions is presented in this section. These control structures include:

- temporary diversions;
- temporary drainage channels;
- permanent drainage channels;
- check dams; and
- culverts.

The construction, inspection, and maintenance of these control structures will be based on standard engineering and soil conservation practices. The methods presented in this section are taken from ODNR [1996]. Other methods of erosion and sediment control shall be implemented as approved by the Construction Manager.

5.2 Temporary Diversions

5.2.1 Definition

Temporary diversions include drainage channels and/or diversion berms constructed across a slope. A detail illustrating a constructed temporary diversion is provided in ODNR [1996].

5.2.2 Purpose

In general, temporary diversions are intended to prevent erosion. This is accomplished by diverting surface-water (overland sheet flow) from areas where the water may cause erosion to areas where the water can be used or disposed safely.

The Contractor will use temporary diversions to:

- divert surface-water runoff away from impacted areas of the OSDF;
- divert surface-water runoff away from unprotected slopes to a stabilized outlet;
- divert sediment-laden surface-water runoff from a disturbed area to a temporary sedimentation basin;
- divert surface-water runoff around an excavation; and
- shorten the flow length within a long sloping drainage area.

5.2.3 Application

The Contractor will construct temporary diversions in areas where surface-water runoff from higher-lying areas have the potential to damage or is damaging: (i) lower-lying areas; (ii) cut or fill slopes or steeply sloping land; (iii) critical sediment source areas; and (iv) active gullies or other erodible areas.

Temporary diversions will have stable outlets and Contractor will utilize materials and practices, which will provide stability to the diversions throughout their planned life. Guidelines for stability are provided in ODNR [1996]. Diversions are not recommended below high sediment-producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment, are installed with or before the diversions. The Contractor will locate the temporary diversions according to outlet condition, topography, land use, soil type, and length of

slope. Temporary diversions will be located so that surface-water will discharge to established water disposal areas, a stable watercourse, waterway, or structure.

5.2.4 Maintenance

The Contractor will inspect and maintain temporary diversions as follows:

- check for points of scour or bank failure, rubbish or channel obstruction, rodent holes, breaching or settling of the berm, excessive wear from pedestrian or construction traffic;
- repair damage and remove deposits or sediment from the temporary diversion; and
- restabilize as needed.

Inspection will occur at a frequency described in Section 7.0 of this SWMEC Plan. If the temporary diversion is found to accumulate sediment, the Contractor will periodically clean out accumulated sediment.

5.3 Temporary Drainage Channels

5.3.1 Definition

A temporary drainage channel is a natural or constructed channel or outlet shaped or graded to convey surface-water runoff and runoff. The channel may have a protective lining of vegetation or erosion-resistant materials such as concrete, riprap, or erosion mat.

All temporary drainage channels will have stable outlets exhibiting adequate capacity for the design flow. The outlet must discharge in such a manner as not to cause erosion. Outlets should be constructed and stabilized prior to the operation of the temporary drainage channels.

5.3.2 Purpose

The Contractor will construct temporary drainage channels to provide for the conveyance of excess surface-water from diversions and other erosion and sediment control measures, or natural concentrations of flow without causing erosion or flooding.

5.3.3 Application

The Contractor will construct temporary drainage channels as needed to manage surface-water runoff and runoff and to control erosion resulting from concentrated runoff. Temporary drainage channels will be designed by the Contractor to meet the requirements of Section 2.0 of this SWMEC Plan. Whenever possible, temporary drainage channels will be used in such a way that preserves the existing and permanent drainage system. Temporary drainage channels will generally be located in existing and permanent drainage ways where surface-water can drain in from all sides. In all situations, drainage channels will be located so that they do not make sharp, unnatural changes in direction of flow.

The proposed locations for temporary drainage channels will be selected by the Contractor based on the Contractor's sequence of construction activities and in accordance with the Contractor's SWMEC Work Plan. Supplemental measures, such as check dams, may be used in conjunction with temporary drainage channels.

5.3.4 Maintenance

The Contractor will inspect and maintain the temporary drainage channels in accordance with the following.

- Inspection will occur at a frequency described in Section 7.0 of this SWMEC Plan.
- Temporary drainage channels will be kept clear of debris.

- Any protective lining vegetation or erosion-resistant materials used in the temporary drainage channel will be maintained in the as-built condition to prevent undermining, scour, or deterioration.

5.4 Permanent Drainage Channels

5.4.1 Definition

Permanent drainage channels consist of a series of channels designed to convey surface-water runoff and runoff away from the OSDF. Details of the permanent drainage channels, including the proposed locations, are shown on the Construction Drawings.

5.4.2 Purpose

The permanent drainage channels will be used to prevent surface-water runoff and runoff from damaging the OSDF final cover system.

5.4.3 Application

The Contractor will construct the permanent drainage channels at the perimeter of the OSDF as shown on the Construction Drawings. The permanent drainage system will divert surface-water runoff from abutting land north and east of the facility and rejoin the existing drainage channels north and south of the FEMP former production area. The permanent drainage system will be installed in phases as the OSDF is constructed and closed.

5.4.4 Maintenance

The Contractor will inspect and maintain permanent drainage channels in accordance with the following.

- Inspection will occur at a frequency as described in Section 7.0 of this SWMEC Plan to ensure that the channels are free-flowing and not clogged with sediment or debris.
- Permanent drainage channels will be inspected and kept clear of debris.
- Any protective lining of vegetation or erosion-resistant materials used in the permanent drainage channel will be maintained in the as-built condition to prevent undermining, scour, or deterioration.

5.5 Check Dams

5.5.1 Definitions

Check dams consist of a section of rocks placed at the inlet, along the length, or at the outlet of a drainage structure. A detail illustrating a constructed check dam is provided in ODNR [1996].

5.5.2 Purpose

Check dams may be installed in temporary diversions and temporary and permanent drainage channels to reduce the velocity of the discharged surface-water and reduce erosion.

5.5.3 Application

The Contractor will install check dams in accordance with guidelines presented in ODNR [1996].

5.5.4 Maintenance

The Contractor will inspect and maintain check dams in accordance with the following.

- Inspection will occur at a frequency described in Section 7.0 of this SWMEC Plan to ensure that the structures have not been damaged by high energy flows.
- Check dams will be maintained as-built until no longer needed.

5.6 Culverts

5.6.1 Definition

Culverts are temporary or permanent structures used to convey surface-water beneath a road or other embankment.

5.6.2 Purpose

The Contractor will install culverts to provide:

- temporary means to convey surface-water under construction and operation-related roads; and
- permanent means to convey surface-water under OSDF access roads.

5.6.3 Application

The Contractor will install temporary culverts as needed to manage surface-water runoff and runoff. The Contractor will design temporary culverts to meet the requirements of Section 2.0 of this SWMEC Plan and the DCP. Temporary culverts will also be designed to withstand construction traffic loading. The size, length, slope,

materials, and locations of permanent culverts will be as shown on the Construction Drawings.

5.6.4 Maintenance

The Contractor will inspect and maintain the culverts as follows.

- Inspection will occur at a frequency described in Section 7.0 of this SWMEC Plan to ensure that the culverts are clear of debris and not damaged.
- Maintenance will be performed to ensure that culverts are functioning as designed. This will include removal and disposal of any trapped sediment or debris.
- Maintenance will be performed to ensure that adequate cover is maintained over the culvert to prevent excessive deflection of the culvert under traffic loading.

6.0 SEDIMENT CONTROL STRUCTURES

6.1 Introduction

A description of the general requirements for construction, inspection, and maintenance of the sediment control structures for temporary conditions are presented in this section. These structures include:

- silt fences; and
- temporary sedimentation basins.

The construction, inspection, and maintenance of the sediment control structures should be based on standard engineering and soil conservation practices. The methods presented in this section are taken from ODNR [1996]. Other methods of erosion and sedimentation control shall be implemented as approved by the Construction Manager.

6.2 Silt Fences

6.2.1 Definition

A silt fence is a temporary sediment barrier constructed of posts and geotextile filter. The geotextile filter is stretched across and attached to the supporting posts and is entrenched. The silt fence is generally placed on the level contour of the land near the toe of a slope, although it can also be placed in a minor drainage way to intercept and detain sediment and decrease flow velocities from drainage areas of limited size.

6.2.2 Purpose

The Contractor will use silt fences to:

- intercept and detain small amounts of sediment from disturbed areas during construction operations to prevent sediment from leaving the site;

- decrease the velocity of sheet flow across the slope and very low level channel flow in the drainage way; and
- prevent sediment from washing into the impacted runoff catchment areas of OSDF active cells.

6.2.3 Application

The Contractor will install silt fences following the contours on the downslope side of areas to be disturbed, near the toe of the slope. A silt fence should not be placed directly at the toe of the slope if it is at all possible to place it several (preferably at least a horizontal distance of 5 feet) away from the toe. Criteria for establishing silt fence locations are provided on ODNR [1996]. These temporary features shall be maintained functional until permanent surface-water and erosion control structures are established.

Silt fences will be placed in the active OSDF cells as described in the IMP Plan. Under no circumstances will silt fences be installed in streams or in drainage channels where flows are likely to exceed 1 cubic foot per second, based on peak flow rates from the applicable design storm event [GeoSyntec, 2000c2001b].

6.2.4 Maintenance

The Contractor will inspect and maintain all silt fences in accordance with the following.

- Inspection will occur at a frequency described in Section 7.0 of this SWMEC Plan to identify areas that require repair or removal of accumulated sediment.
- Accumulated silt and debris will be removed from behind the face of the silt fence when the silt deposits reach approximately one-half the height of the silt fence, taking care not to damage the silt fence when removing the accumulated sediment.

- If surface-water runoff overtops the silt fence, if water flows under or around the ends, or if the flow in the vicinity of the silt fence becomes concentrated, one of the following will be performed by the Contractor, as appropriate: (i) change the layout of the silt fence; (ii) remove the accumulated sediment; or (iii) install a different erosion and sediment control measure.
- Should the geotextile filter on a silt fence decompose, become damaged, or become ineffective and the silt fence is still a necessary erosion and sediment control, the geotextile filter will be replaced promptly.
- Any sediment deposits remaining in place after the silt fence is no longer required will be dressed to conform with the existing grade, prepared to receive interim vegetation as described in Section 4.0 of this SWMEC Plan, and seeded.
- The silt fences within active OSDF cells will be inspected and maintained in accordance with the IMP Plan.
- Silt fencing will be removed when it is no longer needed.

6.3 Temporary Sedimentation basins

6.3.1 Definition

A temporary sedimentation basin is a structure designed to capture and store sediment and other waterborne debris.

6.3.2 Purpose

Temporary sedimentation basins are constructed downgradient of construction activities. Sedimentation basins are not 100 percent effective in trapping sediment which flows into them. Therefore, they should be used in conjunction with erosion control measures such as interim vegetation and/or diversions to reduce the amount of

sediment flowing into the basin. Temporary sedimentation basins will receive only surface-water not wastewater.

6.3.3 Application

The Contractor will construct temporary sedimentation basins in accordance with the Construction Drawings and as described in the Technical Specifications. Temporary sedimentation basins will be located to intercept the largest possible amount of surface-water runoff from the disturbed areas. Temporary sedimentation basins will be removed after the exposed areas are adequately protected against erosion by vegetative or mechanical means as directed by the Construction Manager.

Removal of a temporary sedimentation basin will consist of:

- draining the sedimentation basin of all water;
- removing the sediments from the basin;
- removing primary and emergency spillways and appurtenances;
- grading the sedimentation basin to the lines and grades provided by the Construction Manager; and
- revegetating disturbed areas.

6.3.4 Maintenance

The Contractor will inspect and maintain the temporary sedimentation basins. Inspection will occur at a frequency described in Section 7.0 of this SWMEC Plan. Regular maintenance will include repair of eroded areas, replacement of vegetation or riprap around the basins, repair of damaged or clogged spillways in the basins, and removal of sediment from the basins. Sediment will be removed to the design capacity when the sediment retained in the basin storage depth has reduced to one-half of the basin's original storage depth, and at a minimum of once annually.

7.0 INSPECTION AND CORRECTIVE ACTIONS

7.1 Introduction

A description of general requirements for inspection and corrective action common to surface-water management and erosion control measures is presented in this section. Inspection is required to evaluate the effectiveness and need for maintenance of the surface-water management and erosion control measures. These general requirements include:

- frequency of inspection;
- format of inspection records; and
- scheduling of any identified corrective actions.

The inspection and maintenance of surface-water and erosion control measures should be based on standard engineering and soil conservation practices. The methods presented in this and preceding sections are taken from ODNR [1996]. The Contractor will maintain, repair, and replace surface-water management and erosion control measures throughout the duration of the Contractor's contract in accordance with this SWMEC plan and the Technical Specifications.

7.2 Inspections

Inspections by the Contractor of the surface-water and erosion control measures will occur, at a minimum, at the following frequencies:

- weekly;
- daily after each rain event exceeding 0.5 inches; and
- at least daily during prolonged rainfall events.

7.3 Records of Inspection

Records of Inspections will be kept on file in a secured on-site location by the Contractor and will be submitted monthly to the Construction Manager. Records of Inspection will include the following:

- summary of the scope of the inspection;
- name of the inspector;
- inspection date;
- purpose of the inspection (e.g., regular, weekly, following a storm, etc...);
- inspection location;
- observations relative to performance of the surface-water management and erosion and sediment control measures;
- any necessary corrective actions; and
- corrective actions completed and their performance since the previous inspection.

7.4 Corrective Actions

Corrective actions will be performed as required in Technical Specifications and this SWMEC Plan. Required corrective actions to surface-water management and erosion control measures will be initiated by the Contractor upon discovery, but no later than 24 hours after discovery.

8.0 REFERENCES

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